Golder Associates Inc.

1951 Old Cuthbert Road, Suite 301
Cherry Hill, NJ 08034
Tel: (856) 616-8166
Fax: (856) 616-1874

11/04

REMEDIAL DESIGN WORK PLAN
OPERABLE UNIT 2
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY

Prepared for:

216 Paterson Plank Road Cooperating PRP Group

Prepared by:

Golder Associates Inc.
1951 Old Cuthbert Road, Suite 301
Cherry Hill, New Jersey

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November 2004

Project No.: 943-6222

Golder Associates Inc.

1951 Old Cuthbert Road, Suite 301
Cherry Hill, NJ 08034
Telephone (856) 616-8166
Fax (856) 616-1874
www.golder.com

November 9, 2004

Project No.: 943-6222

Chief, New Jersey Compliance Branch
Emergency and Remedial Response Division
U.S. Environmental Protection Agency, Region II
290 Broadway
New York, NY 10007-1866

Attn: Ms. Stephanie Vaughn

RE: REMEDIAL DESIGN WORK PLAN - OPERABLE UNIT 2
216 PATERSON PLANK ROAD SITE, CARLSTADT, NJ

Dear Ms. Vaughn:

On behalf of the 216 Paterson Plank Road Cooperating PRP Group (Group) we enclose three copies of the Remedial Design Work Plan (RDWP) for Operable Unit 2 at the above site. This work plan is submitted pursuant to the Consent Decree entered between USEPA and the Group that was effective on September 30, 2004. As requested, three copies have also been transmitted directly to the New Jersey Department of Environmental Protection (NJDEP).

Please do not hesitate to call if any questions arise during your review of this document, and we look forward to working with you to design and implement the selected remedy.

Very truly yours,

GOLDER ASSOCIATES INC.

for P. Stephen Finn, C. Eng.
Project Coordinator

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Enclosure

cc: Riché Outlaw, NJDEP
216 Paterson Plank Road Technical and Executive Committees
William L. Warren, Esq.

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1.0 INTRODUCTION

On behalf of the 216 Paterson Plank Road Cooperating PRP Group (Group), Golder Associates Inc. (Golder) has prepared this Remedial Design Work Plan (RDWP) for the Second Operable Unit (OU-2) at the 216 Paterson Plank Road Site (Site) in Carlstadt, New Jersey. On August 12, 2002, the United States Environmental Protection Agency (USEPA) issued a Record of Decision (ROD) (USEPA, 1993) for the OU-2 that identified the selected final remedy for the fill and shallow groundwater above the clay layer underlying the Site. Groundwater contamination at deeper levels will be addressed as part of Operable Unit 3 (OU-3) in a subsequent remedy selection process. A Consent Decree lodged on July 14, 2004, with an effective date of September 30, 2004, provides for implementation of the OU-2 remedial action by the Group.

Pursuant to the Consent Decree, the RDWP is one of several pre-design submittals, including submittals of qualifications for the Group's Project Coordinator and Supervising Contractor, and an associated Quality Management Plan. By letter dated August 12, 2004, USEPA approved the Group's nomination of P. Stephen Finn as Project Coordinator and Golder Associates as the Supervising Contractor.

This RDWP has been prepared pursuant to the requirements set forth in the Consent Decree and establishes a framework for activities related to the remedial design of the OU-2 remedy. Specifically, the objectives of the RDWP, as defined in the Statement of Work (SOW) included as Appendix D to the Consent Decree, are as follows:

- Identify any data needs that must be fulfilled in order to complete the Remedial Design for OU-2;
- Describe the Remedial Design tasks and present an approach for the completion of the Remedial Design;
- Describe any approvals and institutional controls which will be needed to comply with the Consent Decree; and,
- Provide a schedule for the Remedial Design activities and a draft schedule for remedial action, operation and maintenance, and monitoring.

In addition, this RDWP presents the assignments and responsibilities of key personnel on the design team.

2.0 BACKGROUND

The 6-acre 216 Paterson Plank Road Site is a former chemical recycling and waste processing facility that ceased operation in 1980 and was placed on USEPA's National Priorities List (NPL) in 1983. The property is bordered to the southwest by Paterson Plank Road, to the northwest by Gotham Parkway, to the southeast by a trucking company, and to the northeast by Peach Island Creek as shown on Figure 1.

The following sections provide a brief overview of the major remedial activities conducted at the Site to date.

2.1 Previous Studies

A Remedial Investigation (Dames and Moore, 1990) was initiated in 1987, which evaluated soil and groundwater beneath the Site. Borings were advanced at 30 locations during the remedial investigation, and chemical analyses were performed on soil samples from 17 of these borings. In broad terms, the investigation revealed ground conditions comprising fill overlying a clay layer, which was in turn underlain by glacial till and bedrock. Fourteen shallow piezometers (P-1 to P-14), and seven shallow monitoring wells (MW-1S to MW-7S), were installed in the fill zone, along with three deeper monitoring wells (MW-2D, MW-5D, and MW-7D) as shown on Figure 2.

An initial Feasibility Study was conducted in 1989 by Environmental Resources Management, Inc. (ERM, 1989). The Feasibility Study evaluated remedial alternatives for the designated First Operable Unit (OU-1) comprising groundwater and soils/sludge above the clay layer.

A total of nine monitoring wells were installed off-property by Dames and Moore in 1989 pursuant to Project Operations Plan (POP) No. 8 (Dames and Moore, 1988). Five shallow monitoring wells were screened within the fill (MW-8S to MW-12S) and four deeper monitoring wells were installed (MW-8D, MW-11D, MW-12D, and MW-13D).

A deep bedrock monitoring well (MW-2R) was installed on the property by Dames and Moore in 1989 pursuant to POP No. 9 (Dames and Moore, 1988). Dames and Moore also excavated 23 test pits in July, 1989 to evaluate the nature of the fill material. The results are summarized in a report titled Final Report - Excavation of Test Pits (Dames and Moore, 1989).

A Baseline Risk Assessment (BRA) for the Site was conducted by Clement Associates (Clement, 1990) for the USEPA. The BRA followed USEPA guidance for conducting risk assessments current at the time and utilized the information primarily collected during the initial phase of the RI. USEPA subsequently selected an interim remedy for OU-1 in 1990 (See Section 2.2).

Following implementation of the interim remedy, and at the request of USEPA, a Focused Feasibility Study (FFS) was conducted by Golder for the final remedial action for the fill and shallow groundwater. The work was conducted pursuant to the Focused Feasibility Study Work Plan (Golder, 1995). The FFS also included an investigation of a distinct sludge area, which was presented in the Focused Feasibility Study Investigation Report (Golder, 1997) and a treatability study of sludge materials pursuant to a Treatability Study Work Plan (Golder, 1998). The FFS was finalized in April 2001 leading to USEPA's selection of a final remedy for fill and shallow groundwater in August, 2002, referred to as Operable Unit 2 (OU-2).

2.2 1990 Record of Decision – Operable Unit No. 1

USEPA issued a ROD dated September 14, 1990, selecting an interim remedy for OU-1 based on the Remedial Investigation, Feasibility Study, and the BRA. The ROD defined OU-1 as "contaminated soils and groundwater above the clay layer" and the selected remedy comprised the following major elements:

- Installation of a slurry wall around the entire Site;
- Installation of an infiltration barrier over the Site;
- Installation of a groundwater collection system, and extraction of groundwater from the OU-1 zone; and,
- Off-site treatment and disposal of extracted groundwater.

USEPA determined that the selected Interim Remedy would "reduce the migration of hazardous substances, pollutants and contaminants out of the first operable unit zone" and be "consistent with an overall remedy which will attain the statutory requirement for protectiveness."

The Interim Remedy was designed and implemented by the Group pursuant to an Administrative Order (Index No. II CERCLA - 00116) dated September 28, 1990. The Interim Remedy consists of the following:

1. A lateral containment wall comprising a soil-bentonite slurry wall with an integral high density polyethylene (HDPE) vertical membrane which circumscribes the property;

2. A horizontal "infiltration barrier" consisting of high density polyethylene (HDPE) covering the property;

3. A sheet pile retaining wall along Peach Island Creek;

4. An extraction system for shallow groundwater consisting of five extraction wells screened in the fill, which discharge to an above grade 10,000 gallon holding tank via an above grade header system; and,

5. A chain link fence that circumscribes the Site.

The design of the Interim Remedy is presented in the Interim Remedy Remedial Design Report (Canonie, 1991) and construction was undertaken between August, 1991 and June, 1992. As part of the Interim Remedy design, 18 soil borings were conducted to evaluate subsurface conditions in the vicinity of the proposed slurry wall. The Interim Remedy construction is documented in the Final Report - Interim Remedy for First Operable Unit (Canonie, 1992).

The Interim Remedy has been in operation since June 1992 and extracted groundwater is regularly shipped, via tanker trucks, to the DuPont Environmental Treatment (DET) facility, located in Deepwater, New Jersey, for treatment and disposal. Between March 1993 and March 1994, the extraction system was not operational because of pump fouling by free phase product (Canonie, 1993). Existing Site conditions are shown on Figure 2.

Maintenance and monitoring of the Interim Remedy are conducted pursuant to the USEPA approved Operations and Maintenance Plan (Canonie, 1991) and subsequent addenda approved by USEPA. The sample points and analytical parameters are described in the approved O&M Plan which formed part of the Interim Remedy Remedial Design Report (Canonie, 1991) as subsequently modified pursuant to USEPA's letters dated April 18, 1997 and September 29, 1999. The current O&M sampling program includes sampling of surface water points SW-01 through SW-04 quarterly for Target Compound List (TCL) volatile organic compounds (VOCs) and annually for TCL pesticides/PCBs and Target Analyte List (TAL) metals. Groundwater sampling is performed annually for off-property fill zone monitoring wells MW-8S, MW-9S, MW-10S, MW-11S, and MW-12S and till monitoring wells MW-5D, MW-7D, RMW-8D, RMW-11D, RMW-12D, and RMW-13D (refer to Figure 2) for full TCL and TAL parameters.

2.3 Geologic and Hydrogeologic Conditions

Previous on- and off-property investigations (Dames & Moore, 1990; Golder, 1997) indicate that the Site stratigraphy generally consists of the following geologic units, in decending depth order:

- Man-made fill, generally containing abundant and massive debris (thickness ranging from 3 to greater than 12 feet);
- A meadow mat of peat, organic silt and clay intermixed with sand (thickness ranging from 0 to 7feet);
- Marine organic grey fine sand and silt (with a relatively uniform thickness of 2 feet);
- Glaciolacustrine deposits including an upper varved clay and a lower massive red clay (thickness ranging from 0 feet to 30 feet);
- Glacial till (with variable thickness across Site); and,
- Brunswick shale bedrock (encountered at approximately 60 feet below ground surface).

During the previous investigations, numerous chemical constituents were detected in the Fill Area material, including volatile organic compounds (VOCs) such as benzene, tetrachloroethylene and toluene; semi-volatile organic compounds (SVOCs) which were generally polynuclear aromatic hydrocarbons (PAHs); a small number of pesticides such as aldrin and dieldrin; polychlorinated biphenyls (PCBs); and metals such as copper and lead.

The sludge area located within the eastern corner of the Site has been determined to be a "Hot Spot" covering about 4,000 square feet in area and consisting predominantly of sludge material and fine-grained soil with little debris. A surficial layer of fill, approximately 0.5 to 8 feet thick, overlies this sludge area, and the sludge includes the highest VOC and PCB concentrations detected anywhere on the property. The limits of the sludge area were defined during the Focused Feasibility Study Investigation (Golder, 1997) and are illustrated in Figures 2 through 4; the volume of the sludge Hot Spot is approximately 1,480 cubic yards.

The Site is underlain by the following three groundwater units in descending depth order:

- Shallow Water Bearing Fill Unit: The shallow water table above the clay unit;
- Till aquifer, which consists of the water-bearing unit within the till between the clay layer and the bedrock; and,
- Bedrock aquifer, which is used regionally for potable and industrial purposes.

Shallow groundwater within the fill is part of OU-2. Deeper groundwater is part of OU-3 and is addressed in detail in the Operable Unit 3 Investigation Report (Golder, 2003).

3.0 DESCRIPTION OF OU-2 REMEDY

The overall purpose of the OU-2 remedy is to provide long-term source control through a combination of treatment and containment. The specific Remedial Action Objectives for OU-2 as described in the ROD are to:

- Mitigate the direct contact risk and leaching of constituents from soil, fill material and sludge into the groundwater;
- Reduce the toxicity and mobility of the Hot Spot constituents via treatment;
- Provide hydraulic control and containment of the shallow aquifer on-site; and,
- Perform remediation in a manner that may allow site re-use for certain limited commercial purposes.

The OU-2 Remedy is the final remedy for the soils (fill) at the Site and includes remediation of the sludge Hot Spot and improvements to the existing interim remedy (OU-1) for the remainder of the Fill Area. The major components of the Selected Remedy are briefly discussed below.

3.1 Hot Spot In-Situ Treatment

In-Situ treatment of the sludge will be performed using the following technologies:

- Air Stripping
- Solidification/stabilization

Air stripping via soil mixing with air injection will be performed using large augers or paddles covered by a shroud. The soil/sludge will be mixed for approximately 2 hours consistent with the treatability study. To enhance volatilization and removal of constituents (primarily VOCs), air will be introduced and a negative pressure will be maintained within the shroud to capture VOCs released during mixing. Recovered VOCs will be treated using appropriate treatment technologies such as vapor phase activated carbon or a catalytic oxidizer. The air treatment method will be determined during the design in order to meet emission standards. After completion of air stripping, cement and lime will be used as the solidification/stabilization agents and applied to the sludge at a rate of approximately 10 percent cement and 10 percent lime by weight. These reagents will be introduced and mixed using augers or paddles to achieve thorough homogenization, consistent with the treatability study.

The limits of the sludge area based on the Focused Feasibility Study Investigation are shown on Figures 2 through 4. It is anticipated that air stripping and stabilization/solidification will extend horizontally beyond the limits of the identified sludge area on the order of 2 to 3 feet to ensure treatment of the entire sludge area. However, the actual extent of treatment beyond the sludge area will depend on subsurface conditions encountered, since the large debris present outside the sludge area precludes treatment. Treatment will extend through the sludge into the natural ground surface based on the cross-sections (Figures 3 and 4) i.e., 10-18 feet below existing ground surface. Mixing will be carried out on an overlapping grid pattern to ensure effective treatment of the entire sludge area.

Performance standards for hot spot treatment are described in Section 7.2.1. As detailed in the SOW, if appropriate performance standards for treatment, solidification and containment are not met during the Hot Spot treatment portion of the remedy, the Hot Spot will be removed. In the event Hot Spot removal is required, a design for the Hot Spot removal work will be submitted to the USEPA for approval.

3.2 Streambank Enhancements

The existing sheet pile bulkhead along Peach Island Creek, which protects the slurry wall in the riparian area, will be improved and upgraded. The principal design objective for the streambank enhancement is to provide improved stability, while avoiding adverse impacts to the existing slurry wall containment system.

Remedial design activities will consider improvements including, but not limited to, the following:

- Partial removal of the existing sheet pile wall, and establishing natural, vegetated sloped conditions;
- Partial removal of the existing sheet pile wall, and replacing it with a conventional gravity-type wall system (e.g., gabion or bin wall systems); and,
- Partial removal of the existing sheet pile wall, and installation of a new sheet pile wall.

The remedial design will integrate the proposed impermeable cap into the selected streambank enhancement alternative. The selected streambank enhancement may consist of a combination of the above alternatives, due to space constraints between the soil-bentonite slurry wall and the existing sheet pile wall.

Soil materials excavated as part of the streambank enhancement work will either be consolidated on Site beneath the proposed impermeable cap, or characterized and disposed off-site in accordance with applicable regulations.

3.3 Cover System

A cover will be installed over the entire Fill Area currently circumscribed by the existing slurry wall as shown on Figure 2. The cover will consist of a 2-foot thick "double containment" system, designed, constructed and maintained to meet the substantive requirements of RCRA Subtitle C (40 CFR 264.310). Two preliminary cover sections have been identified, a vegetated surface option and an asphalt surface option. Conceptual cross-sections for each system are illustrated in Figure 5 and feature "double containment" in both cases. In the vegetated option, the two containment layers are a geomembrane and a geosynthetic clay layer, and in the second option the asphalt layer and a geomembrane provide the two barriers. Alternate methods and materials, which provide equal or superior performance, may be considered during design. The basic components of each of the cover sections include a prepared subgrade, a drainage layer, and a double barrier system.

Prior to construction of the cover, the Site will be graded to provide adequate drainage, and proof-rolled to provide a suitable subgrade for cover construction. Grading will be minimized to the extent practical to limit disturbance of the existing ground surface. Fill generated from the streambank and groundwater extraction system enhancements may be used for grading purposes. Site drainage will be directed to Peach Island Creek consistent with existing conditions.

3.4 Upgrading Existing Groundwater Recovery System

The existing, interim groundwater recovery system, which consists of above-ground piping, and recovery wells screened in the Fill Area, will be improved. The existing system will be upgraded via installation of approximately six new extraction wells installed around the perimeter of the Site (see Figure 6). The wells and related header system piping and electrical wiring will be installed underground in clean utility corridors around the Site perimeter to maximize flexibility for future Site use. A geotextile will be placed within the utility corridor to separate the existing fill from clean imported soils. Excavated soils will be used as grading fill under the proposed cover or will be characterized and disposed off-Site in accordance with applicable regulations.

Extracted groundwater will be conveyed to a collection point for off-Site disposal. Disposal will be via sewer connection or tanker truck transport for treatment at the Bergen County POTW; or, tanker truck transport to a permitted commercial facility such as DuPont Environmental Treatment.

The goal of shallow groundwater extraction will be to maintain inward gradients across the slurry wall, except along Peach Island Creek where inward gradients are not possible. It should be noted that the groundwater levels outside the slurry wall are subject to seasonal fluctuations because of the shallow nature of the groundwater. As such, inward gradients over the entire year may not always be observed, particularly during drier periods when the levels are lowest outside the slurry wall. Since these periods are relatively short, they are unlikely to represent material reversal of gradients from the Site. Additional piezometers will be installed along the north, west and south sides of the Site, inside and outside of the slurry wall to monitor hydraulic gradients (see Figure 6). Existing monitoring wells and piezometers within the slurry wall that are no longer required will be decommissioned.

3.5 Institutional Controls

Institutional controls to restrict use of the property and otherwise ensure the continued effectiveness of the remedy will be implemented. The Group has secured the necessary access easement from the current property owner (the Borough of Carlstadt) to implement the remedy, and the easement also provides the Borough's approval to apply the required Deed Notice to the property upon completion of the remedy. The form of Deed Notice approved by USEPA and the Borough is included as Appendix F to the Consent Decree.

4.0 EVALUATION OF SLURRY WALL PERFORMANCE

The Operations and Maintenance Plan (O&M Plan) for OU-1 requires ongoing monitoring of the groundwater and surface water conditions at the Site. Groundwater levels inside and outside the slurry wall are monitored quarterly, shallow groundwater outside the slurry wall is analyzed regularly as is surface water from Peach Island Creek. These programs have been in place since 1992 and provide a substantial performance database.

Water Levels

Shallow monitoring wells are situated both on and off property. Water levels within the slurry wall are monitored in piezometers P-2, P-3, P-4, P-5, P-6, P-8, P-9R and P-14. Water levels in the adjacent fill, outside the slurry wall, are monitored in piezometers P-10 and P-11 and in monitoring wells MW-8S, MW-9S, MW-10S, MW-11S and MW-12S. Groundwater has been lowered on the average by more than 3 feet within the Fill Area since OU-1 groundwater extraction commenced in mid-June, 1992 and the data indicate that inward gradients across the slurry wall have been maintained, except along Peach Island Creek where the gradient is towards the creek. These data suggest that the slurry wall, in conjunction with the infiltration barrier and groundwater extraction system, is maintaining hydraulic control.

Shallow groundwater constituent concentrations outside the Fill were monitored quarterly from 1992-1999 and annually since 2000 as approved by USEPA. The samples are analyzed for the Contract Lab Program (CLP) analyte list which comprises the Target Compound List (Volatile Organic Compounds [VOCs], Semi-Volatile Organic Compounds [SVOCs] and pesticides and polychlorinated biphenyls [PEST/PCBs]) and the Target Analyte List (metals and cyanide).

Groundwater and Surface Water VOCs

VOCs are more mobile than most other target list compounds in groundwater and are therefore a good indicator of constituent mobility. Appendix A Table 1 provides the measured VOC concentrations, in µg/L, taken from off-site shallow fill monitoring wells over the monitoring period. Low levels of VOCs have been sporadically detected in the shallow fill monitoring wells. In 75% of the samples collected (120 of 156 samples), VOCs were either non-detect or consisted of only methylene chloride and/or acetone. Methylene chloride and acetone are common laboratory contaminants and have historically been detected in the blanks. Of the remaining 36 samples, there have been only seven samples in which a constituent exceeded the New Jersey Groundwater

Quality Standards (GWQS) for a Class II-A aquifer[1]. Since 1993, there have been only two exceedances of the Class II-A GWQS:

- MW-8S in September 1996
- MW-8S in December 2000

Due to the apparent increase in VOCs in MW-8S in 2000, and the possibility this could be a sampling anomaly, this well was re-sampled during the first quarter 2001. No VOCs were found, consistent with prior sampling events.

Because the groundwater gradient along Peach Island Creek is towards the Creek, surface water samples within the Creek are collected quarterly for VOC analysis. Four surface water points are sampled in each event: SW-01, SW-02, SW-03 and SW-04 as shown on Figure 2. Sample SW-03 is taken adjacent to the Site, SW-04 is upstream from the Site, and samples SW-01 and SW-02 are collected downstream from the Site.

The measured VOC concentrations, in µg/L, in the surface water samples from 1992 to 2003 are shown in Appendix A Table 2. For comparison, Table 2 also shows analyses of samples taken before implementation of OU-1. Low levels of VOCs have been detected sporadically in the surface waters. In 30% of the samples collected (50 of 171 samples) VOCs were either non-detect or were limited to methylene chloride and/or acetone. Methylene chloride and acetone are common laboratory contaminants and have historically been detected in the blanks.

In the remaining 121 samples, low levels of VOCs were detected. No constituents exceeded the New Jersey Surface Water Quality Standards (SWQS) for SE surface water and thirty-three constituents exceeded the SWQS for FW2 surface water[2]. These thirty-three samples represent eighteen sampling events, two of which occurred before implementation of OU-1. Six of the others also show exceedances in the sample (SW-04) taken upstream from the Site.

[1] Class II-A standards are referred to here for comparison purposes only. Class II-A is effectively the most stringent standard and the hydrogeologic setting of the shallow fill is such that less stringent Class III-B standards would likely apply.

[2] FW2 (general surface waters not designated in N.J.A.C. 7:9b-1.15(h) to be set aside for posterity) standards are referred to here only for comparison. FW2 is effectively the most stringent standard outside of waters set aside for posterity, the less stringent SE (the general surface water classification applied to saline waters of estuaries) is likely applicable to Peach Island Creek.

Groundwater and Surface Water SVOCs

Low levels of 23 different SVOCs have been detected in the shallow groundwater since the completion of OU-1 in 1992 (Appendix A, Table 3), the largest proportion of which were detected in MW-9S. Of these detected constituents, only one exceeded the New Jersey Groundwater Quality Standards (GWQS) for a Class II-A aquifer in a single event: 0.2 ppb of Benzo(a)pyrene was detected in MW-11S in November, 2001. This was the only detection of Benzo(a)pyrene over the entire sampling period.

Of the surface water samples analyzed for SVOCs (Appendix A, Table 4), there were 24 detections of 6 different compounds, of which only one was detected in more than a single event: bis(2-ethylhexyl)Phthalate. This compound was detected in 18 samples and exceeded the New Jersey Surface Water Quality Standards (SWQS) for SE surface water on thirteen occasions. The concentrations were variable and, furthermore, since November 1993, samples from downstream are generally the same concentration or lower than SW-04, taken upstream from the site, which suggests that the Site does not contribute this constituent to the surface water.

Groundwater and Surface Water Pesticides/PCBs

Twenty-one different pesticide or PCB compounds were detected in groundwater (Appendix A, Table 5), none of which exceeded NJ GWQS. Surface water (Appendix A, Table 6) has been sampled quarterly through 1993 and annually since, and eighteen different compounds have been detected. Three of these compounds exceeded NJ SWQS for FW2 surface waters: 4,4'-DDD, 4,4'-DDE, and Alpha-BHC. There were six exceedances in 1995, one in 1997, and 5 in 1998. None of these compounds have been detected in the surface water since 1998.

Groundwater and Surface Water Inorganics

There were 1058 detections of twenty-four metals throughout the period of sampling, twelve of which exceeded NJ GWQS. All but fifteen of these exceedances occurred prior to 1996. There was one exceedances (Cadmium) in 1996, two exceedances (Iron) in 1998, one exceedance (Arsenic) in 1999, two exceedances (Chromium) in 2000, no exceedances in 2001, one exceedance (Cadmium) in 2002, eight exceedances (of Iron, Lead, Sodium, and Arsenic) in 2002, and no exceedances in 2003.

There were 858 detections of 24 metals in surface water, of which 159 exceeded NJ SWQS for FW2 surface waters. All but thirty-one of these exceedances occurred prior to 1996. Since 1996,

four metals have exceeded NJ SWQS: Arsenic, Copper, Mercury, and Thallium. These metals were not detected in every sample in every sampling event and furthermore, samples from downstream are generally at the same or lower concentrations than SW-04, taken upstream from the site, which suggests that the Site does not contribute metals to the surface water. One exception is a spike in the Copper concentration in SW-02 and SW-03 first observed in December 1994 and has subsequently declined.

Construction of the slurry wall has clearly ameliorated the shallow groundwater and surface water conditions outside the Fill Area, and the slurry wall continues to be effective. Data from the on-going OU-1 O&M Plan monitoring program will be used as the basis for the Preliminary Design of the upgraded groundwater extraction system and OU-1 monitoring activities will continue until they are superseded by the O&M Plan for OU-2.

5.0 PRE-DESIGN INVESTIGATION

The Focused Feasibility Study Investigation (Golder, 1997) delineated the extent of the sludge Hot Spot, and ongoing O&M monitoring will allow evaluation of the continued effectivness of the slurry wall. Therefore, in accordance with the SOW, the pre-design investigation (PDI) is focused on sampling shallow soils between the slurry wall and the existing sheet pile wall. These objectives of this investigation are to:

- Further examine subsurface geotechnical conditions between the existing slurry wall and installed sheet pile wall for the design of the streambank enhancements;
- Determine sediment elevations within Peach Island Creek in front of the existing sheet pile wall; and,
- Establish geotechnical engineering design parameters for the underlying geologic strata.

In addition, a topographic survey of the Site and adjacent areas will be performed to provide a base map for design purposes. The following sections will present additional details regarding these activities.

Consistent with the SOW, soil investigations will be conducted in accordance with the Quality Assurance/Quality Control Project Plan (QAPP) and Sampling, Analysis and Monitoring Plan (SAMP) contained in the Focused Feasibility Investigation Work Plan (Golder, 1997); groundwater monitoring will be conducted in accordance with the QAPP and SAMP contained in the Work Plan Amendment for the Off Property Investigation (Golder, 1995). All fieldwork will be conducted in accordance with the Health and Safety Plan (HASP) provided in the Work Plan Amendment for the Off-Property Investigation (Golder, 1995). The initial level of protection for all work involving drilling on-Site will be Level D-2. All necessary equipment for possible upgrade to Level C respiratory protection and personal protective equipment (PPE) will be kept on-Site. If Level B respiratory protection and PPE becomes necessary, all work will immediately cease and engineering controls will be implemented until the necessary equipment and personnel can be mobilized on-Site to ensure the work will be completed in a safe manner.

5.1 Subsurface Investigations

The PDI will include the advancement of five geotechnical borings (see Figure 2) between the existing slurry and sheet pile walls, spaced equidistant along the sheet pile wall.

Borings will be drilled from existing ground surface, and will terminate within the underlying glacial till stratum. Hence, these borings would be drilled to about 40 to 50 feet below ground surface. Truck-mounted and/or "skid" rig drilling equipment will be used to advance the required borings to the specified depths and soil samples will be continuously collected using a split barrel samples in accordance with ASTM Standard D1586. In addition, Standard Penetration Test results (SPT N-Values) will be recorded and noted on field borehole logs, and soil samples will be preserved in glass jars for verification of field soil descriptions and sample selection for laboratory testing (i.e., moisture content, Atterberg Limits, particle size analysis).

Undisturbed "Shelby" tube soil samples (3-inch diameter) will be attempted in the underlying soft peat, organic silt and clay deposits at a minimum frequency of one (1) per borehole. It may be difficult to collect undisturbed soil samples of very soft peat and organic silt sediments exhibiting low plasticity. In that event, in-situ vane shear tests may be used, if undisturbed sample recovery is poor, in order to obtain the geotechnical data required for design.

During drilling activities, water level measurements will be collected and recorded where/when observed. In addition, water level measurements will be collected for all existing piezometers within the vicinity of each borehole.

Drill cuttings and fluids will be collected and disposed off-Site in accordance with federal, state and local regulations or placed under the cover during remedial action. Upon completion of the drilling activities, all borings will be sealed in accordance with New Jersey Department of Environmental Protection (NJDEP) requirements. The existing HDPE cover will be repaired in the area of each borehole.

5.2 Laboratory Testing

The following geotechnical laboratory tests will be performed:

Test	ASTM Method	No. of Tests
Moisture Content	D-2216	25
Atterberg Limits	D-4318	16
Percent Passing #200 Sieve	D-1140	10
Particle Size Analysis (sieve plus hydrometer)	D-422	8
1-D Consolidation (with extra reload/unload cycle)	D-2435	6
Unconsolidated/Undrained Tri-axial Shear	D-2850	6
Consolidated/Undrained Tri-axial Shear	D-4767	3

5.3 Topographic Base Map

An updated topographic base map of the Site will be required for the design of the cap and streambank enhancements. It is anticipated that the topographic map will be field surveyed and prepared at a 1-foot contour interval using the existing coordinate system (New Jersey State Plane, NAD 1983, in feet) and datum (NGVD 1929). An adequate distance beyond the Site will also be surveyed. The topographic base map will include the metes and bounds survey conducted in 2003. Survey crews will be trained for work on hazardous waste sites in accordance with OSHA 1910.120(e) requirements and will follow the Site HASP. The base map will be sealed by a New Jersey licensed surveyor.

6.0 REMEDIAL DESIGN DELIVERABLES

The following design deliverables will be submitted to the USEPA for approval, as described in the SOW:

- A Preliminary (35%) Remedial Design Report;
- A Pre-Final (95%) Remedial Design Report; and,
- A Final Remedial Design (100%) Report.

The anticipated content of each deliverable and the design schedule are discussed in the following sections.

6.1 Preliminary Remedial Design Report (35% Design)

The Preliminary Design Report (PRD) will represent approximately 35% of the overall design effort. The conceptual design of the various elements of the remedy developed in this phase will serve as the basis for the final design, and so the PRD will include appropriate scoping calculations presenting the basis for the design and an accompanying narrative. The emphasis for these calculations will be on development of cost-effective design concepts and demonstrating, with reasonable confidence, their engineering suitability and ability to comply with the performance standards described in Section 7.0.

Preliminary design considerations related to proposed streambank enhancements include:

- Define permit equivalency[3] requirements for various alternatives;
- Evaluate data collected during pre-design investigations, as described herein;
- Establish geotechnical design criteria and construction requirements;
- Perform slope stability and retaining wall design evaluations;
- Assess impacts of streambank enhancements on the existing slurry wall; and
- Establish preferred streambank enhancement to be advanced through final design.

[3] Local, State or Federal permits are not required for work that is being conducted on-Site or in very close proximity to the Site as necessary to implement the remedial work. The substantive technical requirements that would otherwise be included in the permits shall be complied with pursuant to the SOW.

Preliminary design considerations related to the shallow groundwater extraction system include:

- Preliminary design of the number, depth, pumping rates and location of possible additional extraction wells/trenches to maintain long-term inward hydraulic gradients across the slurry wall, where practical;
- Estimation of groundwater effluent concentration and groundwater constituent mass loading for treatment purposes;
- Evaluation of the possibility of discharging the extracted groundwater to the Bergen County POTW for treatment; and,
- Preliminary design of the location of the conveyance system for the extracted groundwater including proposed locations of utility corridors and sizes (based on extraction well locations and well discharges) and electrical requirements.

Preliminary design considerations for the proposed cover system include:

- Cap grading requirements;
- Evaluation of alternative cap materials, leading to a recommended cap design that complies with the requirements of the SOW;
- Stormwater management;
- Soil erosion, paying particular design attention to protecting the creek bank; and,
- Cap drainage layer capacity.

Preliminary design considerations for treatment and stabilization of the hot spot include:

- Consultation with specialist contractors regarding treatment equipment suitable for the type and location of hot spot;
- Evaluation of admixture quantities and associated volume increase; and
- Initial selection and sizing of treatment technology for off-gases.

The PRD will include a series of drawings showing the general arrangement of all Remedial Action (RA) work planned and a design narrative that will include:

- A discussion and evaluation of the RD activities described in Section 3 above, as addressed by the conceptual design;

- A preliminary discussion of the RA Performance Standards as set out in the SOW, and as will be further developed during the design of the remedy components, including a discussion of the manner in which the RA will achieve the Performance Standards;
- A plan for monitoring air quality and treatment of air during the RA;
- A plan for satisfying permit equivalency requirements and an associated schedule;
- A updated draft schedule for remedial action activities; and
- A preliminary schedule for operation and maintenance (O&M) and monitoring activities; and,
- Table of Contents for the specifications, including a listing of items from the Construction Specifications Institute master format, which will include a technical specification for photographic documentation of the remedial construction work.

USEPA comments on the PRD will be incorporated in the Pre-Final Design Report. Following receipt of USEPA comments, it is anticipated that a letter will be prepared describing the manner in which the comments in the Pre-Final Design Report will be addressed.

6.2 Pre-Final Remedial Design Report (95% Design)

The pre-Final RD will constitute a complete design submittal. The major elements of the pre-Final design include finalization of the detailed design of the improvements to the sheet pile wall, the shallow groundwater extraction system (including associated utility corridors), the cover system, treatment of the hot spot (including treatment of associated air emissions), and plans for the treatment and disposal of extracted shallow groundwater.

The pre-Final RD report will include the following final documents:

- Engineering plans representing an accurate identification of existing Site conditions and an illustration of the work proposed. Typical items to be provided on such drawings include, at a minimum, the following:
  a. Title sheet including at least the title of the project, a key map, the name of the designer, date prepared, sheet index, and USEPA/NJDEP Project identification;
  b. All property data including owners of record for all properties within 200 feet of the Site;
  c. A Site survey including the distance and bearing of all property lines that identify and define the project Site;
  d. All easements, rights-of-way, and reservations;
  e. All buildings, structures, wells, facilities, and equipment (existing and proposed) if any;

f. A topographic survey, including existing and proposed contours and spot elevations for all areas that will be affected by the remedial activities, based on U.S. Coast and Geodetic Survey data;
g. All utilities, existing and proposed;
h. Location and identification of all significant natural features including, *inter alia*, wooded areas, water courses, wetlands, flood hazard areas, and depressions;
i. Flood hazard data and 100-year and 500-year flood plain delineation;
j. North arrow, scale, sheet numbers and the person responsible for preparing each sheet;
k. Decontamination areas, staging areas, borrow areas and stockpiling areas;
l. Miscellaneous detail sheets;
m. Definitions of all symbols and abbreviations; and
n. A specification for a sign at the site. The sign should describe the project, the name of the contractor performing the RD/RA work or the PRP Group, state that the project is being performed under USEPA oversight, and provide an USEPA contact for further information.

- Survey work that is appropriately marked, recorded and interpreted for mapping, property easements and design completion;

- Drawings of all proposed equipment, improvements, details and all other construction and installation items to be developed in accordance with the current standards and guidelines of the State of New Jersey . Drawings shall be of standard size, approximately 24" x 36". A list of drawing sheet titles will be provided;

- Engineering plans (as necessary) indicating, at a minimum, the following:
  a. Site security measures;
  b. Roadways; and
  c. Electrical, mechanical, structural, as required.

- Any value engineering proposals;

- Construction Specifications in Construction Specifications Institute master format;

- A Construction Quality Assurance Project Plan (CQAPP), which shall detail the approach to quality assurance during construction activities at the Site, shall specify a quality assurance official (QA Official), independent of the Remedial Action Contractor, to conduct a quality assurance program during the construction phase of the project. The CQAPP shall address sampling, analysis, and monitoring to be performed during the remedial construction phase of the Work. Quality assurance items to be addressed include, at a minimum, the following:

  a. Inspection and certification of the Work;
  b. Measurement and daily logging;
  c. Field performance and testing;
  d. A technical specification for photographic documentation of the remedial construction work;
  e. As-built drawings and logs; and
  f. Testing of the RA Work to establish whether the design specifications have been attained.

- A report describing those efforts made to secure access and institutional controls and obtain other approvals and the results of those efforts. Legal descriptions of property or easements to be acquired shall be provided;
- A plan for implementation of construction and construction oversight;
- A method for selection of the construction contractor(s);
- A refined proposed schedule for implementing all of the above;
- A discussion and evaluation of how the above designs address the Remedial Activities as set forth in the Consent Decree;
- A discussion of how the design will meet the specified Performance Standards; and
- A proposed schedule for O&M and monitoring activities.

6.3 Final Remedial Design Report (100% Design)

The Final Remedial Design Report shall include all of the above, including agreed-to changes requested by the USEPA on reviewing the Pre-Final RD report. The Final Report will include the revised design drawings, specifications and schedule for Remedial Action.

7.0 PERFORMANCE STANDARDS AND PERMIT EQUIVALENCY REQUIREMENTS

7.1 ARARs

The Remedial Design will be undertaken to achieve compliance with the Performance Standards, which shall include the specific technical requirements set forth in the ROD. The Remedial Design must also achieve compliance with applicable and relevant and appropriate requirements (ARARs) specified in the ROD, including substantive requirements promulgated under the Resource Conservation and Recovery Act (RCRA), the New Jersey Technical Requirements for Site Remediation, N.J.A.C. 7-26E et seq., the New Jersey Brownfield and Contaminated Site Remediation Act, N.J.A.C. 58:10B and applicable local requirements including New Jersey Meadowlands Commission (formerly known as the Hackensack Meadowlands Development Commission) regulations. ARARs may relate to the substances addressed by the remedial action (chemical-specific), to the location of the Site (location-specific), or the manner in which the remedial action is implemented (action-specific).

Action-Specific ARARs include, but are not limited to:

- National Emission Standards for Hazardous Air Pollutants (40 CFR Part 61);
- NJ Administrative Code (NJAC) 7:26E *et seq,* New Jersey Technical Requirements for Site Remediation. Note: The substantive requirements of the Technical Requirements may qualify as ARARs where they are more stringent than federal requirements and where they do not conflict with CERCLA or the ROD requirements. This distinction is relevant, for example, where the Technical Requirements require deliverables inconsistent with the NCP or where they require permits that conflict with provisions of CERCLA or the NCP;
- National Ambient Air Quality Standards (40 CFR Part 50);
- RCRA - Land Disposal Restrictions for off-Site disposal (40 CFR Part 268);
- RCRA - Generator Requirements for Manifesting Waste for off-Site Disposal (40 CFR Part 263);
- RCRA - Transporter Requirements for off-Site Disposal (40 CFR Part 270); and
- DOT - Rules for Hazardous Materials Transport for off-Site disposal (49 CFR Parts 107, 171, 173).

7.2 Performance Standards

7.2.1 Hot Spot Treatment

Air stripping and addition of cement and lime (and to the extent necessary and if approved by USEPA, other treatment) of the hot spot will be performed so as to reduce the arithmetic mean total concentration of VOCs to whichever is more stringent of: 10% of the arithmetic mean of untreated samples taken from the hot spot during the Treatability Study ("current level"); the arithmetic mean total concentration of VOCs within the area of concern outside the Hot Spot (i.e., 1,000 ppm based on RI data); or a level which will not interfere with stabilization. The treatment shall also solidify and stabilize the Hot Spot to achieve both an arithmetic mean unconfined compressive strength of at least 15 psi and at least a 90% reduction in the arithmetic mean Synthetic Precipitation Leaching Procedure (SPLP) leachability of PCBs when compared to untreated samples analyzed in the Treatability Study. In addition, the treatment must achieve a 90% reduction in the arithmetic mean SPLP leachability for the constituents listed in Table 1 when compared to untreated samples analyzed in the Treatability Study, or the SPLP leached extract must comply with the respective Maximum Concentrations specified in Table 1. VOCs released during treatment will be collected and treated on-Site to assure no negative impacts to the surrounding community. Air monitoring will be performed during construction/remedial activities at the Site to ensure that air emissions meet applicable or relevant and appropriate air emission requirements.

7.2.2 Streambank Enhancement

Design of the proposed streambank enhancement remedies will follow generally accepted procedures, as typically described in the Naval Facilities Design Manuals DM-7.01 and 7.02. Overall, all proposed wall/slope systems will be designed utilizing static equilibrium methods, and will incorporate factors-of-safety, which are consistent and appropriate to the selected remedial designs. The Preliminary Design report will describe all design criteria, assumptions and methodologies used in design.

7.2.3 Cover Design

The cover system will be designed, constructed and maintained to meet the substantive requirements of RCRA Subtitle C (40 CFR 264.310). Two preliminary cover sections have been identified meeting these requirements, a vegetated surface option and an asphalt surface option. Conceptual cross-sections for each system are illustrated in Figure 5. Alternate methods and

materials, which provide equal or superior performance, may be considered during design. The basic components of each of the cover sections include a prepared subgrade, a double barrier system, and a drainage layer.

7.2.4 Groundwater Recovery, Treatment, and Disposal

Plans and specifications will be developed for installation of new extraction wells along the perimeter of the Site within the Fill Area that will be screened within the fill material, so that groundwater may be extracted as necessary to achieve long term inward hydraulic gradient within the Fill Area, where practical. The extracted groundwater will either be collected in the existing above-ground tank for off-Site disposal, and/or transferred, via sewer connection, to the Bergen County Publicly Owned Treatment Works (POTW) for treatment.

7.3 Permitting Requirements

The need for regulatory permits or permit equivalencies will ultimately depend on the final design of the remedy for the Site. Furthermore, the majority of regulatory permit needs appear to be focused on the stream bank enhancement remedial alternative, and at this time, it is not certain whether said enhancement will fall on the land or water side of the existing sheet pile wall. Therefore, the following sections consider the regulatory permit requirements for streambank enhancements landward/waterward of the existing sheet pile wall and potentially applicable discharge permits for extracted groundwater.

7.3.1 Construction Landward of Existing Sheet Pile Wall

If construction activities are restricted to landward of the existing sheet pile wall, it appears that only a limited number of approvals should be required, including: a) a request to NJDEP for a **Jurisdictional Determination** to determine the need for a **Stream Encroachment Permit** under the Flood Hazard Area Control Act Rules (N.J.A.C. 7:13); and b) **Soil Erosion and Sediment Control Plan Certification** by the Soil Conservation Service will be required since the overall remedial activity exceeds 5,000 sf of soil disturbance.

7.3.2 Construction Waterward of Existing Sheet Pile Wall

If activities are proposed for waterward of the existing sheet pile wall several approvals may be required. There are no wetlands on-site that are regulated by the USACOE and/or NJDEP. The only areas regulated by the USACOE are the tidal waters of Peach Island Creek. Furthermore, it

is Golder's understanding that the NJDEP will not regulate wetlands, wetland transition areas or open waters under the Freshwater Wetlands Protection Act rules (N.J.A.C. 7:7A), given that the project is located within the area regulated by New Jersey Meadowlands Commission (NJMC).

A request for **Jurisdictional Determination** will be submitted to the NJDEP to determine the requirement for a **Stream Encroachment Permit** under the Flood Hazard Area Control Act Rules (N.J.A.C. 7:13).

If the streambank enhancement is to be placed in the same location or slightly waterward of the existing sheet pile wall, the activity would likely be authorized under a **USACOE Nationwide Permit (NWP) #3** for replacement of existing serviceable structures or under **NWP #38** for remediation of hazardous waste sites. In addition, a **NJDEP 401 Water Quality Certification and Coastal Zone Consistency Determination** would be required to authorize either NWP.

Furthermore, any development within the site that is located waterward of the existing sheet pile wall would be regulated under the Coastal Program Permit rules (N.J.A.C. 7:7), and would require a **Waterfront Development Permit** from NJDEP. Activities located landward of the existing sheet pile wall bulkhead are not regulated under this policy. Water quality certification would be automatically issued with a Waterfront Development Permit granted by the NJDEP. Mitigation may be required for any impacts to "intertidal and subtidal shallows", and two wetland mitigation banks are located within the NJMC that can be utilized to provide mitigation.

If not already issued for the site, a **Tidelands Instrument** and accompanying Waterfront Development Permit would be required for work at the site above the mean high water of Peach Island Creek if portions of the site were formerly flowed by the tide. These are lands that are owned by the State of New Jersey and a licensing agreement in the form of a lease, grant, conveyance or management agreement must be obtained, if they are developed by private interests. The Tidelands Claim map for the site is # 721-2160. The "tidelands instrument" should have been recorded in the office of the clerk of Bergen County if it has been obtained.

Since the overall remedial project exceeds 5,000 square-feet of soil disturbance, a **Soil Erosion and Sediment Control plan certification** will be required from the Bergen County Soil Conservation District in accordance with "Standards for Soil Erosion and Sediment Control" and under the Soil Erosion and Sediment Control Act N.J.S.A. 4:24-39 *et seq.* and implementing rules.

7.3.3 Groundwater Discharge Permit

A permit will be required to discharge groundwater from the extraction system to the sanitary sewer and ultimately to the Bergen County Utilities Authority (BCUA) Treatment Works, or to discharge via tanker truck to BCUA. Submittal requirements set forth in the Rules and Regulations for the Direct and Indirect Discharge of Wastewater to the Bergen Utilities Authority Treatment Works include:

- Description of proposed pre-treatment system, if any, including list of all equipment to be used, schematics of the proposed treatment system, and descriptions of target pollutants to be treated through each unit process;
- Site plan with location of structures, test wells, treatment system, proposed connection into sanitary sewer, sampling points, etc.;
- Explanation as to why proposed discharge of groundwater into the sanitary sewer represents the best or only disposal method available compared to surface water, storm sewer, subsurface reinjection well, or off-site disposal. This is to justify waiving the BCUA's prohibition against the discharge of groundwater into the BCUA Treatment Works;
- Report of analytical results of expected pollutants and a list of analytical methods used;
- Description of sampling preservation and chain of custody procedures;
- Description of expected duration of discharge, volume of wastewater, and rate of discharge; and
- Indicate known or expected concentrations or quantity of a list of pollutants potentially in wastewater discharge.

8.0 REMEDIAL DESIGN/REMEDIAL ACTION SCHEDULE

A draft bar chart schedule for implementation of the Remedial Design and Remedial Action required by the Consent Decree is shown in Figure 7. The schedule shown begins with the initial submittal of this RDWP and includes a preliminary schedule for the Remedial Action. The actual schedule will be dependent upon several other factors:

- USEPA's review and approval time for project deliverables;
- Acquisition of required permit equivalences; and,
- Contractor procurement, means and methods, and weather.

The schedule will be refined throughout the Remedial Design and the remedial action and monitoring aspects may be revised, subject to USEPA's approval.

9.0 PROJECT ORGANIZATION

The project management and organization for the Remedial Design is illustrated below. The key personnel selected for the project have broad experience on a variety of CERCLA projects, including multiple remedial designs and management of remedial construction.

Key team members include the following:

Project Coordinator

The Project Coordinator is Mr. P. Stephen Finn, a Principal of Golder Associates. He will be the primary point of communication for the Group and will serve as the liaison between the Agencies (USEPA and NJDEP) and the Remedial Design team. USEPA approved Mr. Finn as the Project Coordinator, by letter dated August 12, 2004.

Golder Project Director

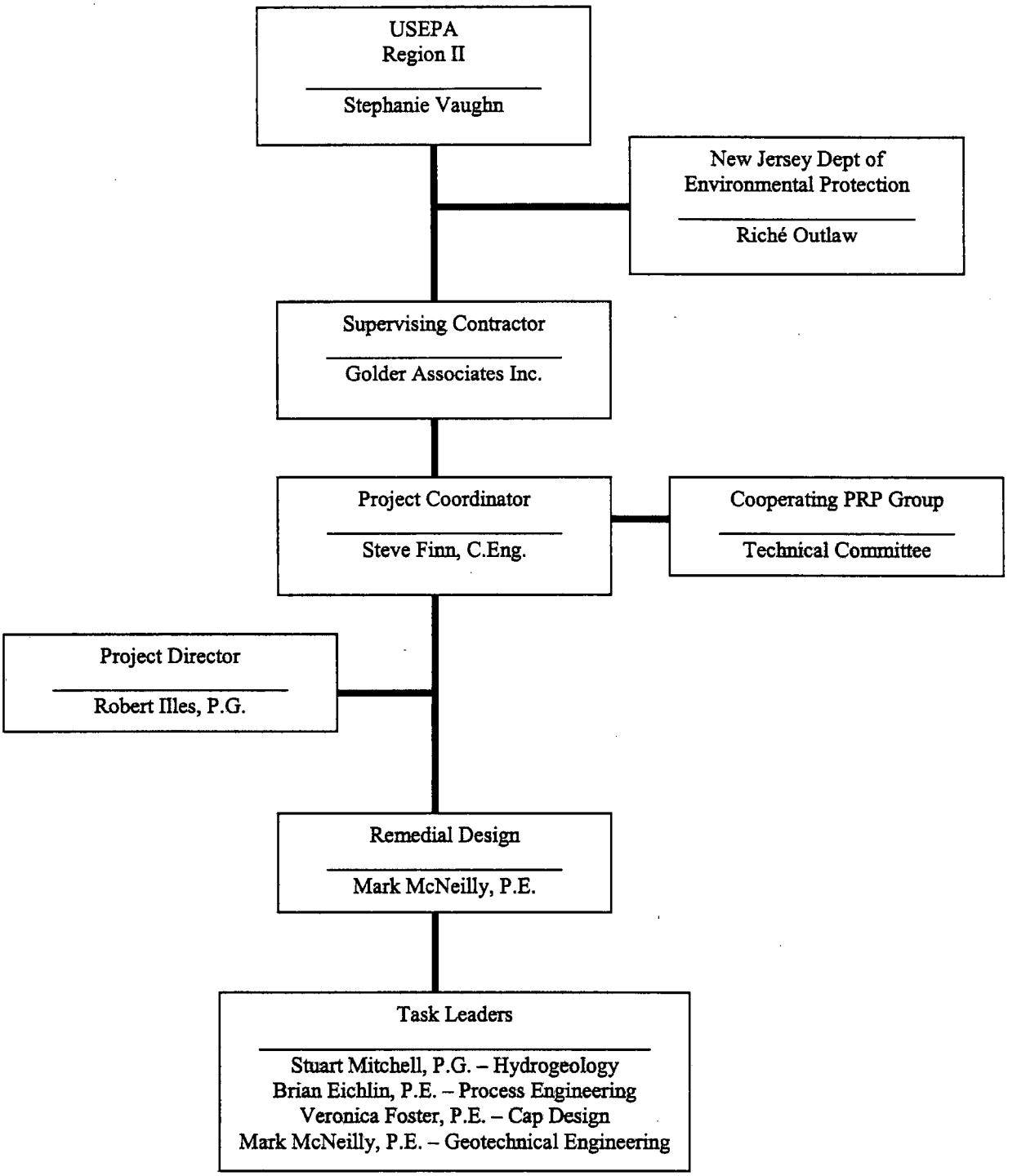
The Project Director for the Remedial Design will be Mr. Robert Illes, an Associate of Golder Associates. Mr. Illes will be responsible for the overall schedule control and technical evaluation of the Remedial Design. He will review all major technical evaluations and reports and will also be responsible for ensuring the appropriate resources are made available to ensure project execution in a timely manner.

Design Manager

The Project Manager for the Remedial Design will be Mr. Mark McNeilly, P.E., an Associate of Golder Associates. Mr. McNeilly will be responsible for the day to day coordination of all design activities. He will be responsible for implementing the project plans, as well as scheduling, and integration of the various technical disciplines which will be required during this project.

Task Leaders

The Task Leaders will be responsible for management of the design elements associated with their key technical disciplines.


USEPA
Region II
Stephanie Vaughn
New Jersey Dept of
Environmental Protection
Riché Outlaw
Supervising Contractor
Golder Associates Inc.
Project Coordinator
Steve Finn, C.Eng.
Cooperating PRP Group
Technical Committee
Project Director
Robert Illes, P.G.
Remedial Design
Mark McNeilly, P.E.
Task Leaders
Stuart Mitchell, P.G. – Hydrogeology
Brian Eichlin, P.E. – Process Engineering
Veronica Foster, P.E. – Cap Design
Mark McNeilly, P.E. – Geotechnical Engineering

10.0 REFERENCES

Canonie Environmental, 1992. "Final Report Interim Remedy for First Operable Unit Scientific Chemical Processing Superfund Site at 216 Paterson Plank Road, Carlstadt, New Jersey," September 1992.

Canonie Environmental, 1991. "Interim Remedy Remedial Design Report," July 19, 1991.

Dames & Moore, 1990. "Final Report - Remedial Investigation SCP Site, Carlstadt, New Jersey," March 1, 1990.

Dames & Moore, 1989. "Test Pit Investigation SCP/Carlstadt July 1989," August 4, 1989.

Dames & Moore, 1988. "Revision No. 9, Project Operations Plan, SCP Site Remedial Investigation, Carlstadt, New Jersey," September 30, 1988.

Dames & Moore, 1988. "Revision No. 8 (Amended) Project Operations Plan, SCP Site Remedial Investigation, Carlstadt, New Jersey," September 30, 1988.

Environmental Resources Management, Inc., 1989. "Preliminary Feasibility Study for the First Operable Unit of the SCP/Carlstadt Site," July 1989.

Golder Associates Inc., 2001. Focused Feasibility Study Operable Unit 2 Final Remedy: Fill and Shallow Groundwater, April 2001.

Golder Associates Inc., 1998. Treatability Testing Work Plan, August 1998.

Golder Associates Inc., 1997. Off-Property Investigation, Interim Data Report, January 1997.

Golder Associates Inc., 1997. Focused Feasibility Investigation Report, November 1997.

Golder Associates Inc., 1995. "Final Work Plan Amendment: Focused Feasibility Study: First Operable Unit Soils and Additional Off-Property Investigation," December 1995.

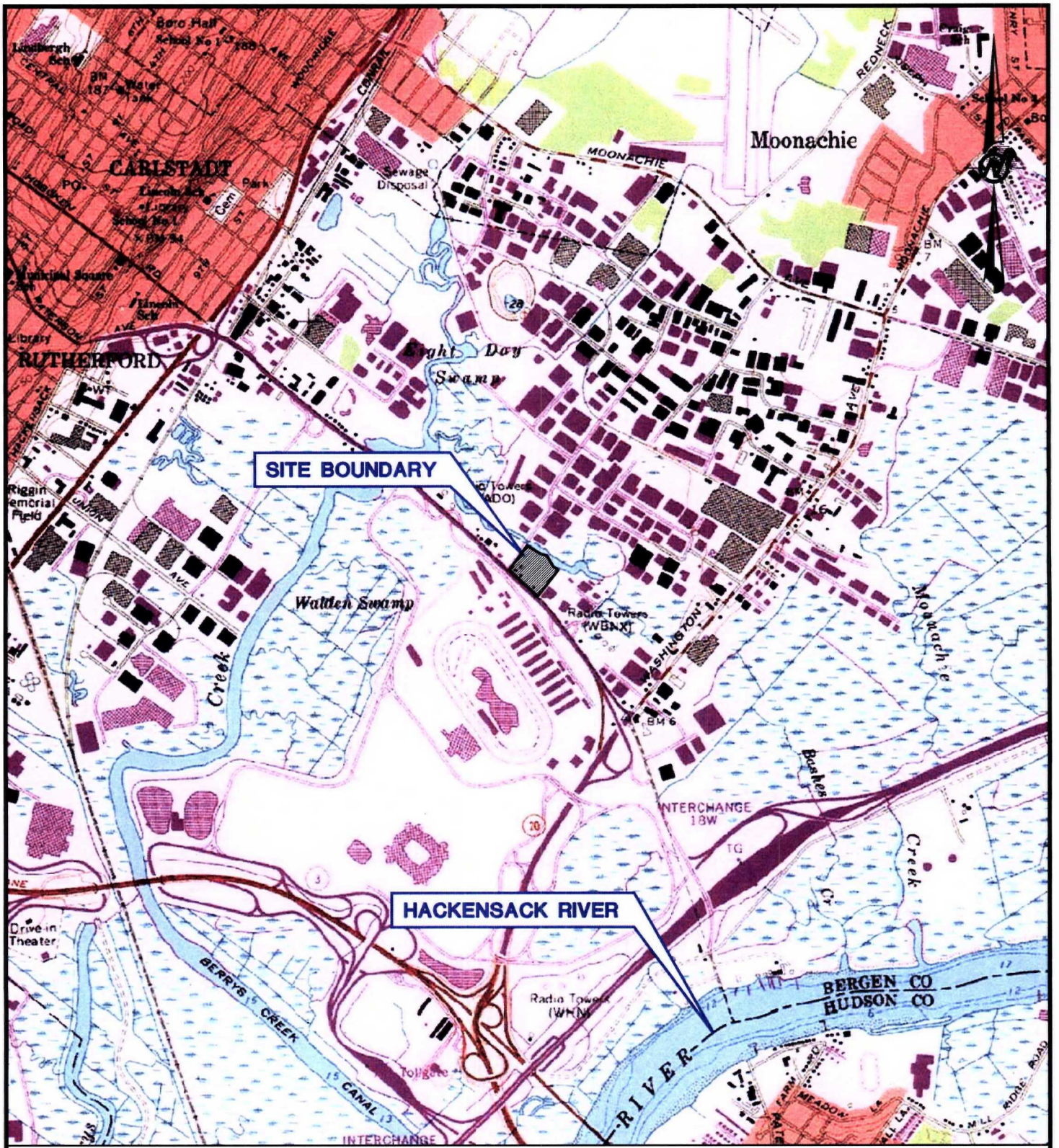
United States Environmental Protection Agency, 1990. "Administrative Order Index No. II CERCLA-00116," September 28, 1990.

United States Environmental Protection Agency, 1985. "Administrative Order Index No. II CERCLA-60102," October 23, 1985

United States Environmental Protection Agency, 1985. "Administrative Order on Consent Index No. II CERCLA-50114," September 30, 1985.

TABLE 1
ALTERNATE PERFORMANCE STANDARDS FOR SPLP EXTRACT
216 PATERSON PLANK ROAD
CARLSTADT, NEW JERSEY

CONTAMINANT	CAS #	REGULATORY LEVEL (mg/l)
Arsenic	7440-38-2	5.0
Barium	7440-39-3	100.0
Benzene	71-43-2	0.5
Cadmium	7440-43-9	1.0
Chlorobenzene	108-90-7	100.0
Chloroform	67-66-3	6.0
Chromium	7440-47-3	5.0
1,2 Dichloroethane	107-06-2	0.5
1,1 Dichloroethylene	75-35-4	0.7
Hexachlorobutadiene	87-68-3	0.5
Lead	7439-92-1	5.0
Mercury	7439-97-6	0.2
Selenium	7782-49-2	1.0
Silver	7740-22-4	5.0
Tetrachloroethylene	127-18-4	0.7
Trichloroethylene	79-01-6	0.5



REFERENCE

1.) BASE MAP TAKEN FROM U.S.G.S. 7.5 MINUTE QUADRANGLE OF WEEHAWKEN, NEW JERSEY, DATED 1967 AND PHOTOREVISED 1981.

Golder Associates
Philadelphia USA

FILE No.	9436222E001
PROJECT No.	943-6222
REV.	0
SCALE	AS SHOWN
DATE	11/09/04
DESIGN	SDM
CADD	RG
CHECK	RJI
REVIEW	PSF

TITLE

SITE LOCATION MAP

216 PATERSON PLANK ROAD SITE

FIGURE 1

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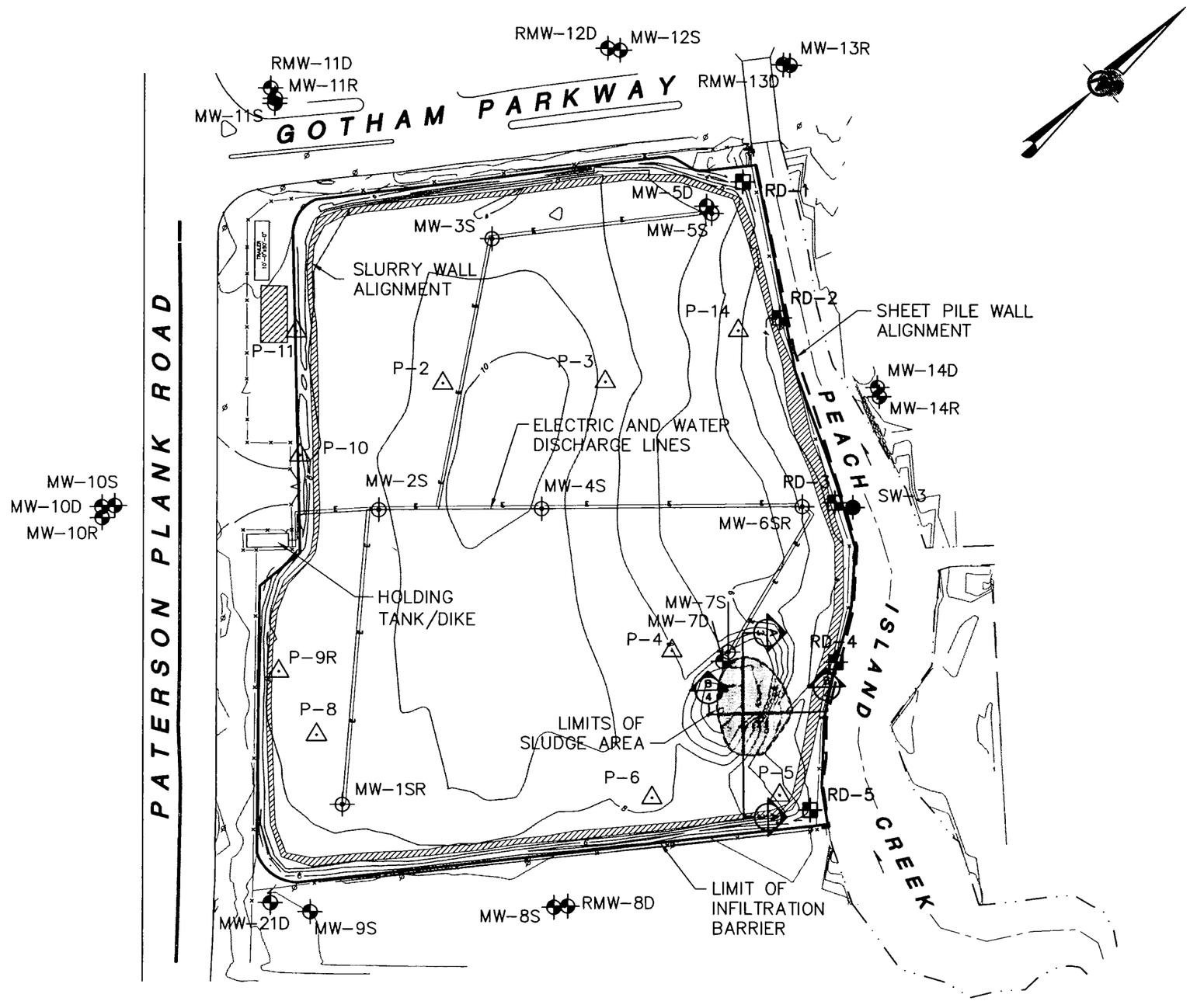

LEGEND

- DETAIL OR CROSS SECTION DESIGNATION / FIGURE No. WHERE DETAIL OR CROSS SECTION IS PRESENTED
- EXISTING GROUND CONTOUR
- STREAM
- FENCE
- UTILITY POLE
- SW-3 — EXISTING SURFACE WATER SAMPLING LOCATION (SEE NOTE 3)
- MW-4S — EXISTING GROUNDWATER EXTRACTION WELLS
- MW-13R — EXISTING GROUNDWATER MONITORING WELL
- P-3 — EXISTING PIEZOMETER
- RD-1 — PROPOSED PRE-DESIGN INVESTIGATION BORINGS
- SLURRY WALL ALIGNMENT
- SHEET PILE WALL ALIGNMENT
- LIMIT OF INFILTRATION BARRIER

NOTES

1.) TOPOGRAPHIC DATA AND SURFACE FEATURES BASED ON INFORMATION BY TAYLOR, WISEMAN & TAYLOR CONSULTING ENGINEERS/SURVEYORS/PLANNERS/ LANDSCAPE ARCHITECTS, MOUNT LAUREL, NEW JERSEY, DATED 06/12/92, SCALE 1"=40'.

2.) APPROXIMATE LIMITS OF SLUDGE AREA ARE TAKEN FROM THE FOCUSED FEASIBILITY STUDY INVESTIGATION REPORT (GOLDER, 1997).

3.) SURFACE WATER SAMPLING POINT SW-1 IS LOCATED AT THE CONFLUENCE OF PEACH ISLAND AND BERRY'S CREEKS, APPROXIMATELY ONE THIRD OF A MILE NORTHWEST OF THE SITE. SURFACE WATER SAMPLING POINT SW-2 IS LOCATED ON PEACH ISLAND CREEK, 150 FEET NORTHWEST OF THE SITE AS MEASURED FROM THE NORTH CORNER OF THE PROPERTY BOUNDARY. SURFACE WATER SAMPLING POINT SW-4 IS LOCATED ON PEACH ISLAND CREEK, 150' EAST OF THE SITE, AS MEASURED FROM THE EAST CORNER OF THE PROPERTY BOUNDARY.

100 0 100
SCALE FEET

*"MEADOWLANDS SPORTS COMPLEX"

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NJ Authorization #24GA28029100
Golder Associates
Philadelphia USA

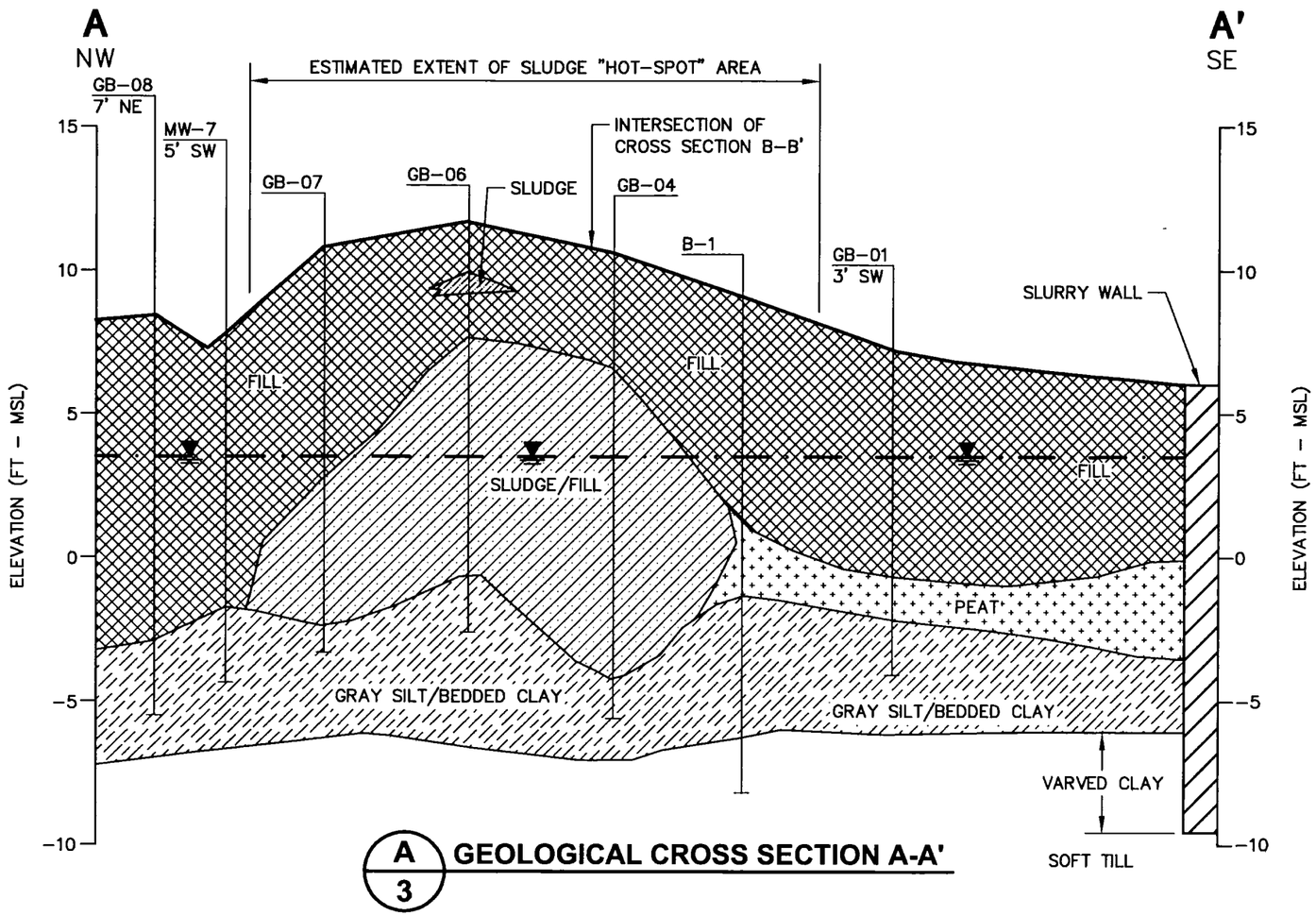
FILE No.	9436222E002
PROJECT No.	943-6222 REV. 0
SCALE	AS SHOWN
DATE	11/09/04
DESIGN	SDM
CADD	RG
CHECK	RJI
REVIEW	PSF

TITLE

SITE CONDITIONS

216 PATERSON PLANK ROAD SITE

FIGURE 2



A/3 **GEOLOGICAL CROSS SECTION A-A'**

LEGEND

- A/3 — DETAIL OR CROSS SECTION DESIGNATION; FIGURE No. WHERE DETAIL OR CROSS SECTION IS PRESENTED
- GB-01 / 4 ft. NW — BOREHOLE LABEL; PROJECTED DISTANCE
- BOTTOM OF BOREHOLE
- FILL
- SLUDGE/FILL
- SLUDGE
- PEAT
- GRAY SILT / BEDDED CLAY (UPPER HORIZON GLACIOLACUSTRINE VARVED CLAY)
- APPROXIMATE GROUNDWATER SURFACE BASED ON AVERAGE WATER LEVEL DATA OBTAINED FROM NEARBY PIEZOMETERS IN JULY 1997

NOTES

1.) CROSS SECTION TAKEN FROM FEASIBILITY STUDY INVESTIGATION REPORT (GOLDER, 1997).

2.) COORDINATE SYSTEM SHOWN IS NEW JERSEY STATE PLANE NAD27 AND VERTICAL DATUM BASED ON NAVD 1929.

2.) LOCATION OF SLURRY WALL INVESTIGATION BORINGS AND TEST PIT LOCATIONS ARE APPROXIMATE. BORING & TEST PIT LOCATIONS WERE PREVIOUSLY SURVEYED USING A SITE SPECIFIC COORDINATE SYSTEM.

20 0 20
HORIZONTAL SCALE FEET

5 0 5
VERTICAL SCALE FEET

REFERENCES

1.) TOPOGRAPHIC DATA AND SURFACE FEATURES BASED ON INFORMATION BY TAYLOR, WISEMAN & TAYLOR CONSULTING ENGINEERS/SURVEYORS/PLANNERS/LANDSCAPE ARCHITECTS, MOUNT LAUREL, NEW JERSEY, DATED 06/12/92, SCALE 1"=40'.

2.) MONITORING WELLS, PIEZOMETERS, AND EXTRACTION WELLS SURVEYED BY GEOD CORPORATION, NEWFOUNDLAND, NJ IN OCTOBER 1996 AND SOIL BORINGS IN AUGUST 1997.

3.) SLURRY WALL BORINGS AND FEATURES FROM THE INTERIM REMEDIAL MEASURES TAKEN FROM CANONIE ENVIRONMENTAL, 1992 "INTERIM REMEDY FOR FIRST OPERABLE UNIT", AUGUST 1992.

4.) DAMES & MOORE, 1990. "FINAL REPORT – REMEDIAL INVESTIGATION SCP SITE, CARLSTADT, NEW JERSEY", MARCH 1, 1990.

5.) DAMES & MOORE, 1989. – "TEST PIT INVESTIGATION SCP / CARLSTADT JULY 1989 CARLSTADT, NEW JERSEY", AUGUST 4, 1989.

Golder Associates
Philadelphia USA

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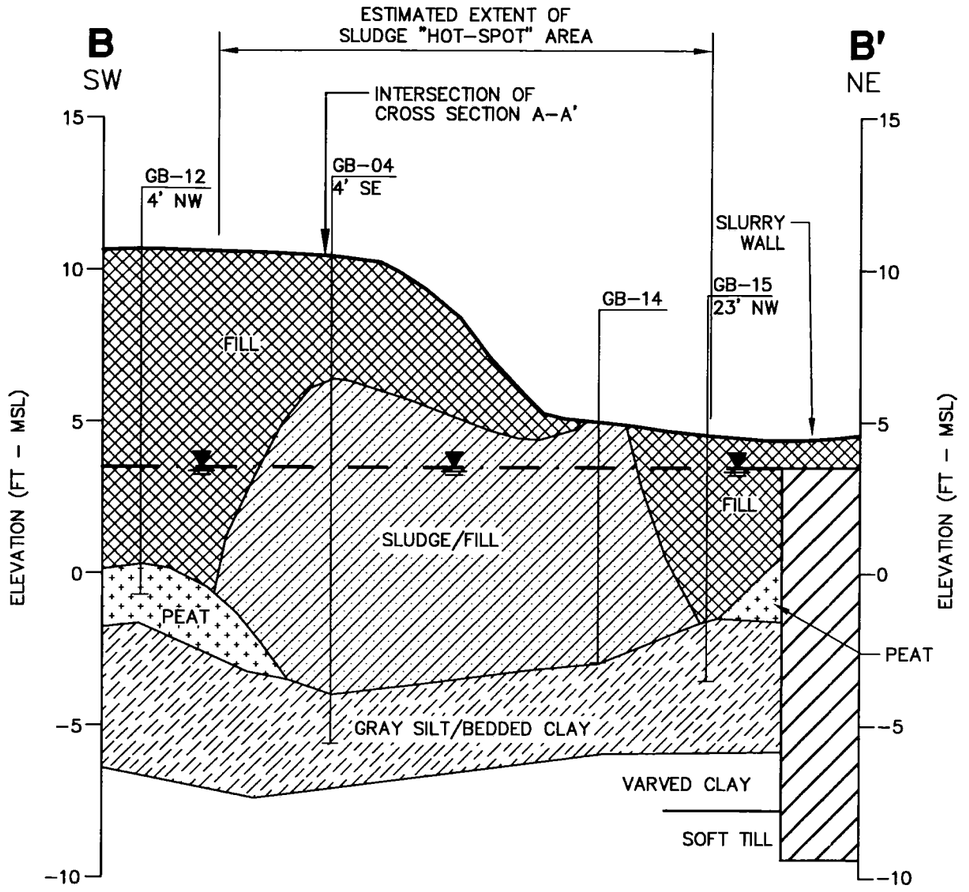
PROJECT No.	943-6222 REV. 0
SCALE	AS SHOWN
DATE	11/09/04
DESIGN	RJI
CADD	RG
CHECK	RJI
REVIEW	PSF

TITLE: **CROSS SECTION A-A'**

216 PATERSON PLANK ROAD SITE | FIGURE 3

Drawing file: 9436222E005.DWG Nov 09, 2004 - 10:34am



B/4 **GEOLOGICAL CROSS SECTION B-B'**

LEGEND

- B/4 — DETAIL OR CROSS SECTION DESIGNATION; FIGURE No. WHERE DETAIL OR CROSS SECTION IS PRESENTED
- GB-01 / 4 ft. NW — BOREHOLE LABEL; PROJECTED DISTANCE
- BOTTOM OF BOREHOLE
- FILL
- SLUDGE/FILL
- SLUDGE
- PEAT
- GRAY SILT / BEDDED CLAY (UPPER HORIZON GLACIOLACUSTRINE VARVED CLAY)
- APPROXIMATE GROUNDWATER SURFACE BASED ON AVERAGE WATER LEVEL DATA OBTAINED FROM NEARBY PIEZOMETERS IN JULY 1997

NOTES

1.) CROSS SECTION TAKEN FROM FEASIBILITY STUDY INVESTIGATION REPORT (GOLDER, 1997).

2.) COORDINATE SYSTEM SHOWN IS NEW JERSEY STATE PLANE NAD27 AND VERTICAL DATUM BASED ON NAVD 1929.

2.) LOCATION OF SLURRY WALL INVESTIGATION BORINGS AND TEST PIT LOCATIONS ARE APPROXIMATE. BORING & TEST PIT LOCATIONS WERE PREVIOUSLY SURVEYED USING A SITE SPECIFIC COORDINATE SYSTEM.

20 0 20
HORIZONTAL SCALE FEET

5 0 5
VERTICAL SCALE FEET

REFERENCES

1.) TOPOGRAPHIC DATA AND SURFACE FEATURES BASED ON INFORMATION BY TAYLOR, WISEMAN & TAYLOR CONSULTING ENGINEERS/SURVEYORS/PLANNERS/LANDSCAPE ARCHITECTS, MOUNT LAUREL, NEW JERSEY, DATED 06/12/92, SCALE 1"=40'.

2.) MONITORING WELLS, PIEZOMETERS, AND EXTRACTION WELLS SURVEYED BY GEOD CORPORATION, NEWFOUNDLAND, NJ IN OCTOBER 1996 AND SOIL BORINGS IN AUGUST 1997.

3.) SLURRY WALL BORINGS AND FEATURES FROM THE INTERIM REMEDIAL MEASURES TAKEN FROM CANONIE ENVIRONMENTAL, 1992 "INTERIM REMEDY FOR FIRST OPERABLE UNIT", AUGUST 1992.

4.) DAMES & MOORE, 1990. "FINAL REPORT – REMEDIAL INVESTIGATION SCP SITE, CARLSTADT, NEW JERSEY", MARCH 1, 1990.

5.) DAMES & MOORE, 1989. – "TEST PIT INVESTIGATION SCP / CARLSTADT JULY 1989 CARLSTADT, NEW JERSEY", AUGUST 4, 1989.

Golder Associates
Philadelphia USA

FILE No.	9436222E006	SCALE	AS SHOWN
PROJECT No.	943-6222 REV. 0	DATE	11/09/04
		DESIGN	RJI
		CADD	AM
		CHECK	RJI
		REVIEW	PSF

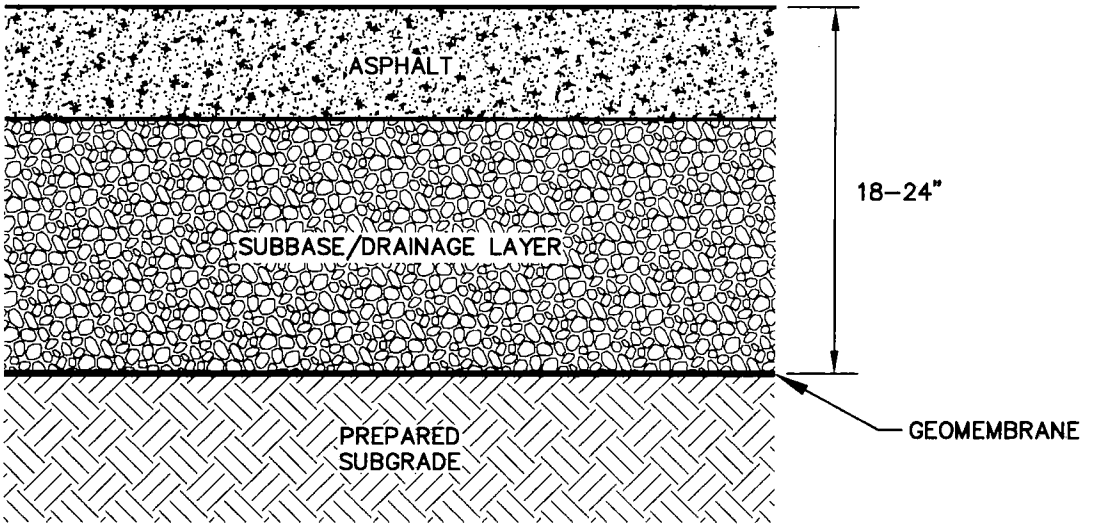
TITLE

CROSS SECTION B-B'

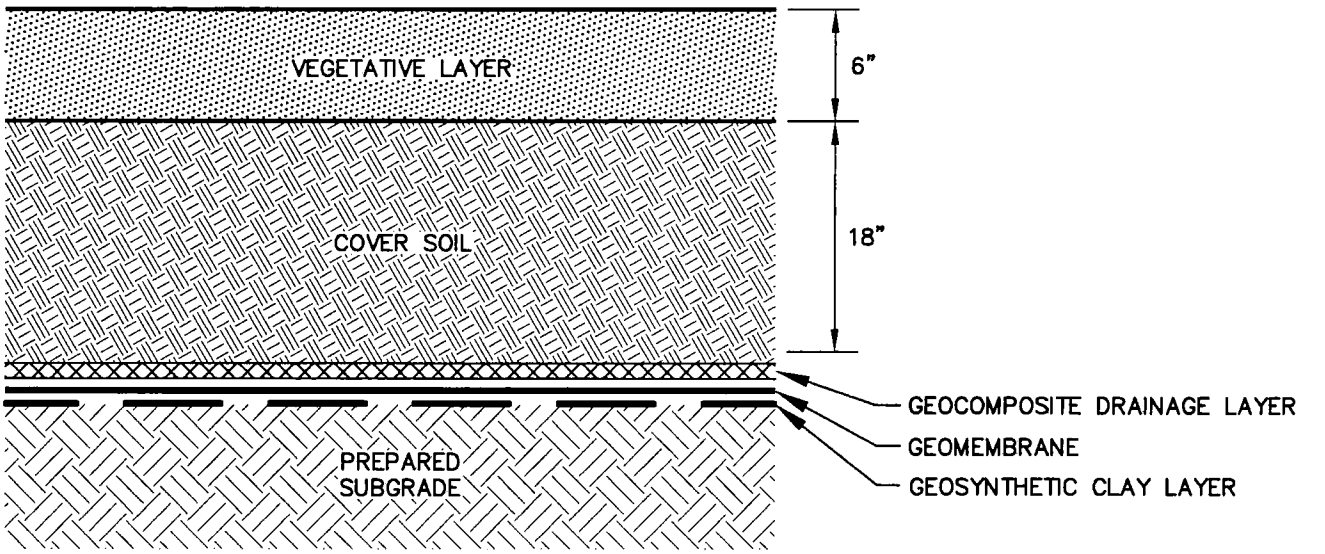
216 PATERSON PLANK ROAD SITE

FIGURE 4

Drawing file: 9436222E006.DWG Nov 09, 2004 - 10:35am



ASPHALT SURFACE OPTION



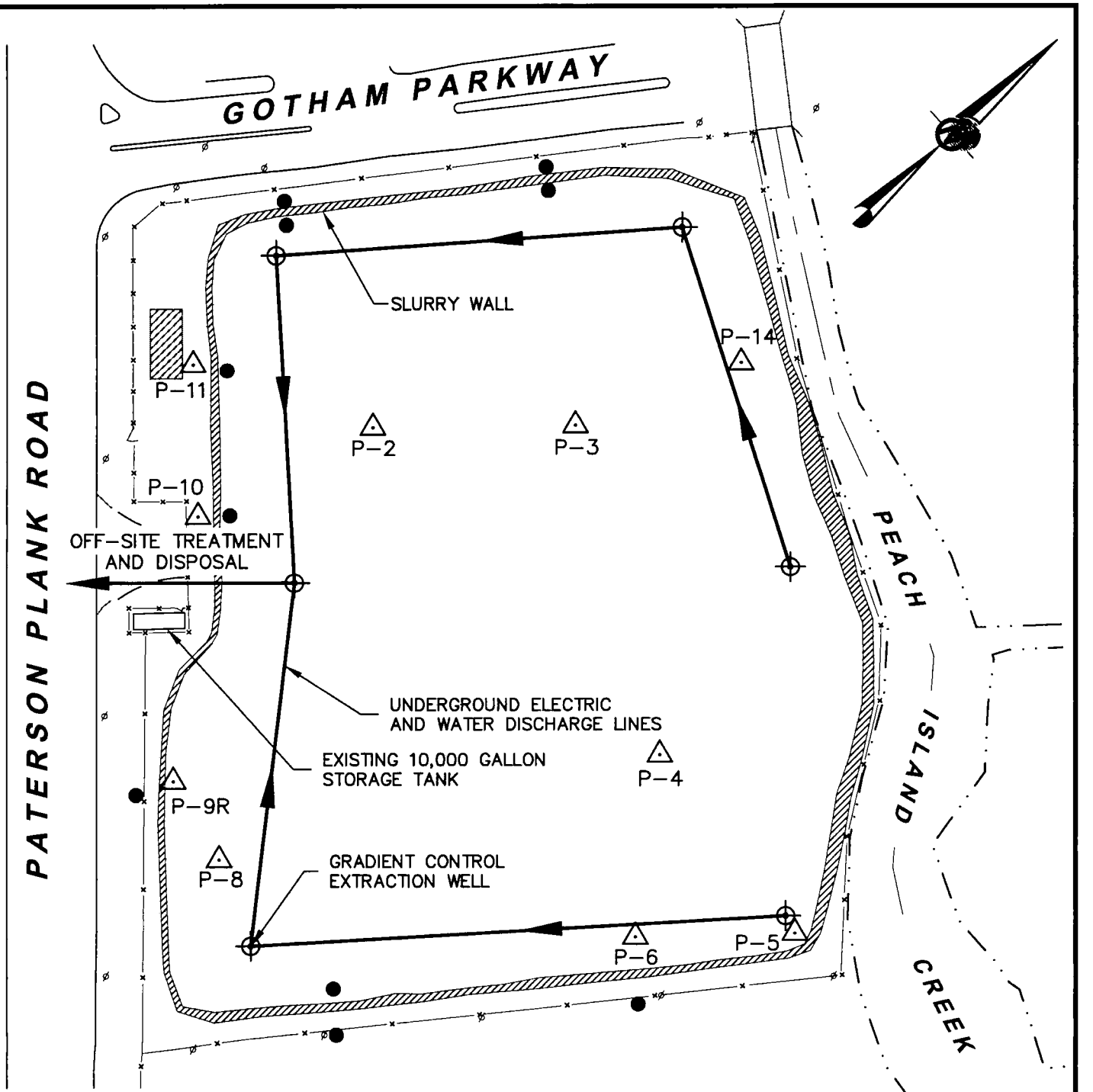
VEGETATED SURFACE OPTION

NOTE

1.) OPTIONS PROVIDE EQUIVALENT PERFORMANCE, AND ACTUAL COVER WILL LIKELY BE A COMBINATION OF OPTIONS TO SUIT SITE RE–USE REQUIREMENTS.

NJ Authorization #24GA28029100 Golder Associates Philadelphia USA	SCALE AS SHOWN	TITLE	
	DATE 11/09/04	CAP OPTIONS	
	DESIGN SDM		
	CADD RG		
FILE No. 9436222E003	CHECK RJI		
PROJECT No. 943–6222 REV. 0	REVIEW PSF	216 PATERSON PLANK ROAD SITE	FIGURE 5

Drawing file: 9436222E003.DWG Nov 09, 2004 – 10:33am



LEGEND

- PROPOSED EXTRACTION WELL
- PROPOSED PIEZOMETER
- EXISTING PIEZOMETER

NOTE

1.) OFF-SITE TREATMENT AND DISPOSAL PREFERABLY AT POTW (OTHERWISE AT PERMITTED COMMERCIAL FACILITY). EXISTING 10,000 GALLON STORAGE TANK MAY BE USED AS NECESSARY.

100 0 100
SCALE FEET

NJ Authorization #24GA28029100
Golder Associates
Philadelphia USA

SCALE	AS SHOWN
DATE	11/09/04
DESIGN	SDM
CADD	RG
CHECK	RJI
REVIEW	PSF
FILE No.	9436222E004
PROJECT No.	943-6222
REV.	0

TITLE

SHALLOW GROUNDWATER EXTRACTION SYSTEM

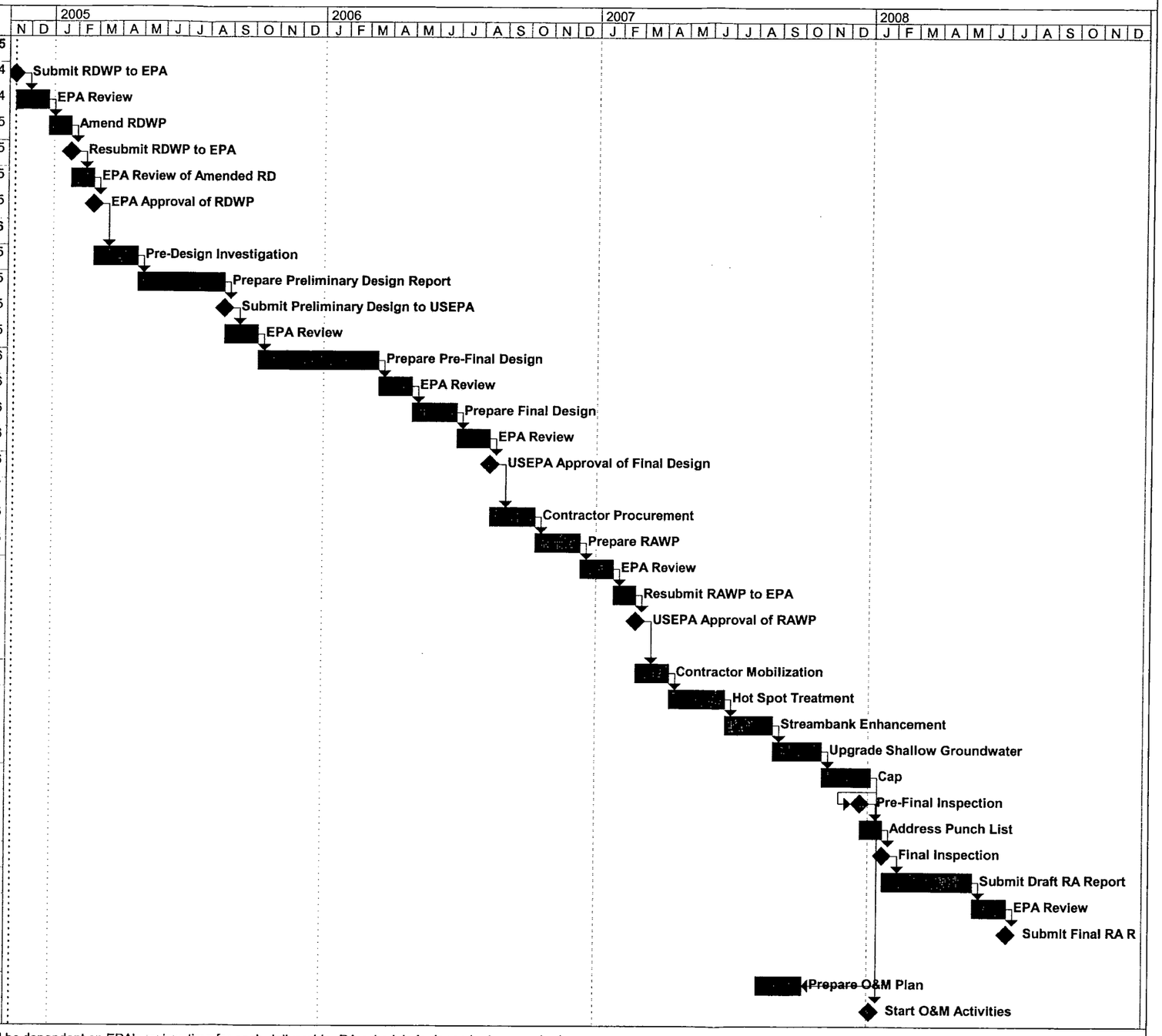
216 PATERSON PLANK ROAD SITE

FIGURE 6

Drawing file: 9436222E004.DWG Nov 09, 2004 - 10:33am

Remedial Design / Remedial Action Schedule

Task Name	Duration	Start	Finish
REMEDIAL DESIGN WORK PLAN (RDWP) ACTIVITIES	**106 days**	**Wed 11/10/04**	**Thu 2/24/05**
Submit RDWP to EPA	0 days	Wed 11/10/04	Wed 11/10/04
EPA Review	45 days	Wed 11/10/04	Sat 12/25/04
Amend RDWP	30 days	Sat 12/25/04	Mon 1/24/05
Resubmit RDWP to EPA	0 days	Mon 1/24/05	Mon 1/24/05
EPA Review of Amended RD	31 days	Mon 1/24/05	Thu 2/24/05
EPA Approval of RDWP	0 days	Thu 2/24/05	Thu 2/24/05
REMEDIAL DESIGN (RD) ACTIVITIES	**535 days**	**Thu 2/24/05**	**Sun 8/13/06**
Pre-Design Investigation	60 days	Thu 2/24/05	Mon 4/25/05
Prepare Preliminary Design Report	120 days	Mon 4/25/05	Tue 8/23/05
Submit Preliminary Design to USEPA	0 days	Tue 8/23/05	Tue 8/23/05
EPA Review	45 days	Tue 8/23/05	Fri 10/7/05
Prepare Pre-Final Design	160 days	Fri 10/7/05	Thu 3/16/06
EPA Review	45 days	Thu 3/16/06	Sun 4/30/06
Prepare Final Design	60 days	Sun 4/30/06	Thu 6/29/06
EPA Review	45 days	Thu 6/29/06	Sun 8/13/06
USEPA Approval of Final Design	0 days	Sun 8/13/06	Sun 8/13/06
REMEDIAL ACTION WORK PLAN (RAWP) ACTIVITIES	**195 days**	**Sun 8/13/06**	**Sat 2/24/07**
Contractor Procurement	60 days	Sun 8/13/06	Thu 10/12/06
Prepare RAWP	60 days	Thu 10/12/06	Mon 12/11/06
EPA Review	45 days	Mon 12/11/06	Thu 1/25/07
Resubmit RAWP to EPA	30 days	Thu 1/25/07	Sat 2/24/07
USEPA Approval of RAWP	0 days	Sat 2/24/07	Sat 2/24/07
REMEDIAL ACTION (RA) ACTIVITIES	**496 days**	**Sat 2/24/07**	**Fri 7/4/08**
Contractor Mobilization	45 days	Sat 2/24/07	Tue 4/10/07
Hot Spot Treatment	75 days	Tue 4/10/07	Sun 6/24/07
Streambank Enhancement	65 days	Sun 6/24/07	Tue 8/28/07
Upgrade Shallow Groundwater	65 days	Tue 8/28/07	Thu 11/1/07
Cap	65 days	Thu 11/1/07	Sat 1/5/08
Pre-Final Inspection	0 days	Sat 12/22/07	Sat 12/22/07
Address Punch List	30 days	Sat 12/22/07	Mon 1/21/08
Final Inspection	0 days	Mon 1/21/08	Mon 1/21/08
Submit Draft RA Report	120 days	Mon 1/21/08	Tue 5/20/08
EPA Review	45 days	Tue 5/20/08	Fri 7/4/08
Submit Final RA Report	0 days	Fri 7/4/08	Fri 7/4/08
O&M ACTIVITIES	**150 days**	**Wed 8/8/07**	**Sat 1/5/08**
Prepare O&M Plan	60 days	Wed 8/8/07	Sun 10/7/07
Start O&M Activities	0 days	Sat 1/5/08	Sat 1/5/08



Actual schedule dates will be dependent on EPA's review time for each deliverable. RA schedule is dependent on required permit equivalences and aproved contractor schedule. All field activities are dependent on weather conditions.

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Figure 7
Remedial Design/Remedial Action Schedule
216 Paterson Plank Road Site

APPENDIX A

SUMMARY OF SHALLOW GROUNDWATER AND SURFACE WATER QUALITY

TABLE A-1
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY
SUMMARY OF GROUNDWATER QUALITY DATA
SHALLOW FILL MONITORING WELLS
VOLATILE ORGANIC COMPOUNDS

SAMPLE ID	LOCATION	SAMPLING DATE										
		Jun-92 1st O&M	Oct-92 2nd O&M	Jan-93 3rd O&M	Apr-93 4th O&M	Aug-93 5th O&M	Nov-93 6th O&M	Apr-94 7th O&M	Jan-95 8th O&M	Apr-95 9th O&M	Jul-95 10th O&M	Nov-95 11th O&M
MW-8S	Off-Property	ND	1,2-dichloroethene 2 benzene 1 xylenes 1	1,1-dichloroethane 1 ~~benzene~~ 4 toluene 4 chloroform 3 chlorobenzene 3	1,2-dichloroethene 58 1,1-dichloroethane 3 ~~vinyl chloride~~ 47 ~~trichloroethene~~ 13 benzene 0.8 carbon tetrachloride 1 toluene 1	1,2-dichloroethene 3 1,1-dichloroethane 2	1,2-dichloroethene 2	ND	ND	ND	1,2-dichloroethene 2 ~~methylene chloride~~ 5	1,2-dichloroethene 1 methylene chloride 2
MW-9S	Off-Property	ND	ND	ND	~~1,1,2,2-trichloroethane~~ 7 2-hexanone 19 4-methyl 2-pentanone 16	ND	ND	ND	ND	ND	acetone 11 ~~methylene chloride~~ 3	1,2-dichloroethene 1 methylene chloride 2
MW-10S	Off-Property	ND	ND	ND	ND	carbon disulfide 1	ND	ND	ND	ND	~~methylene chloride~~ 4	methylene chloride 2
MW-11S	Off-Property	ND	ND	~~benzene~~ 3 toluene 3 chlorobenzene 2	toluene 1 xylenes 7	ND	ND	ND	ND	ND	~~methylene chloride~~ 3 carbon disulfide 1	1,2-dichloroethene 1 trichloroethene 1 methylene chloride 1
MW-12S	Off-Property	ND	1,2-dichloroethene 4 benzene 2 1,1,1-trichloroethane 2 tetrachloroethene 2 ethylbenzene 2 styrene 2	ND	ND	ND	ND	ND	ND	ND	~~methylene chloride~~ 5	methylene chloride 1 acetone 5

SAMPLE ID	LOCATION	SAMPLING DATE				
		Jan-96 12th O&M	Apr-96 13th O&M	Sep-96 14th O&M	Dec-96 15th O&M	Feb-97 16th O&M
MW-8S	Off-Property	methylene chloride 1	1,2-dichloroethene 2 methylene chloride 2	acetone 1 ~~trichloroethene~~ 2	ND	acetone 57
MW-9S	Off-Property	acetone 46 methylene chloride 1	methylene chloride 2	carbon disulfide 1	ND	acetone 1
MW-10S	Off-Property	ND	methylene chloride 2	ND	acetone 7	ND
MW-11S	Off-Property	methylene chloride 1	methylene chloride 2	ND	acetone 17	ND
MW-12S	Off-Property	methylene chloride 1	ND	ND	acetone 18	ND

All units in ug/l.

Concentration exceeds Class II-A Groundwater Quality Standards. Class II-A standards are referred to here for comparison purposes only. Class II-A is effectively the most stringent standard and the hydrogeologic setting of the shallow fill is such that less stringent Class III-B standards would likely apply.

TABLE A-1
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY
SUMMARY OF GROUNDWATER QUALITY DATA
SHALLOW FILL MONITORING WELLS
VOLATILE ORGANIC COMPOUNDS

SAMPLE ID	LOCATION	SAMPLING DATE										
		Apr-97 17th O&M	Jul-97 18th O&M	Nov-97 19th O&M	Mar-98 20th O&M	Apr-98 21st O&M	Jul-98 22nd O&M	Oct-98 23rd O&M	Mar-99 24th O&M	Jul-99 25th O&M	Sep-99 26th O&M	Dec-99 27th O&M
MW-8S	Off-Property	acetone 6	acetone 36 methylene chloride 1 1,2-dichloroethene 2	acetone 40	methylene chloride 1	acetone 10 **methylene chloride 5**	acetone 10 methylene chloride 1	ND	ND	ND	ND	acetone 17 2-butanone 1
MW-9S	Off-Property	acetone 22	ND	acetone 8	methylene chloride 1	acetone 4 methylene chloride 2	methylene chloride 2	ND	ND	ND	ND	ND
MW-10S	Off-Property	ND	acetone 33 methylene chloride 2	acetone 12	methylene chloride 2	acetone 6 **methylene chloride 3**	acetone 9 methylene chloride 2	ND	ND	ND	ND	acetone 20 2-Butanone 1
MW-11S	Off-Property	ND	acetone 30	acetone 11	methylene chloride 2	acetone 2 **methylene chloride 3**	methylene chloride 2	trans-1,2-dichloroethene 3 trichloroethene 1	ND	ND	acetone 21	acetone 20 2-Butanone 4
MW-12S	Off-Property	ND	acetone 18 methylene chloride 2	ND	methylene chloride 1	acetone 14 **methylene chloride 4**	acetone 8 methylene chloride 2	benzene 1	ND	acetone 61	acetone 15	ND

SAMPLE ID	LOCATION	SAMPLING DATE				
		Dec-00 28th O&M	Mar-01 re-sampling of MW-8S	Nov-01 29th O&M	Sep-02 30th O&M	Nov-03 31st O&M
MW-8S	Off-Property	1,1 Dichloroethene 1 1,1 Dichloroethane 1 cis-1,2-Dichloroethene 9 **1,2 Dichloroethane 7** **Trichloroethene 16** **Tetrachloroethene 11**	ND	ND	Benzene 0.5 cis-1,2-Dichloroethene 0.2 Trans-1,2-dichloroethene 0.2 cis-1,2-Dichloroethene 0.2 Trans-1,2-dichloroethene 0.2	Toluene 1
MW-9S	Off-Property	ND		acetone 12	ND	2-Butanone 4 Toluene 0.9
MW-10S	Off-Property	ND		ND	cis-1,2-Dichloroethene 0.2	ND
MW-11S	Off-Property	ND		acetone 24 cis-1,2-Dichloroethene 1	cis-1,2-Dichloroethene 0.2 Benzene 0.3	Tetrachloroethene 0.9 Toluene 3 cis-1,2-Dichloroethene 1
MW-12S	Off-Property	ND		cis-1,2-Dichloroethene 0.8	ND	Toluene 1 cis-1,2-Dichloroethene 0.8

All units in ug/l.

Concentration exceeds Class II-A Groundwater Quality Standards. Class II-A standards are referred to here for comparison purposes only. Class II-A is effectively the most stringent standard and the hydrogeologic setting of the shallow fill is such that less stringent Class III-B standards would likely apply.

TABLE A-2
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY
SUMMARY OF SURFACE WATER QUALITY DATA
VOLATILE ORGANIC COMPOUNDS

SAMPLE ID (Location)	SAMPLING DATE																	
	Jul-87- Pre-IRM PARAMETER		Dec-87-Pre-IRM PARAMETER		Jun-92 PARAMETER		Oct-92 PARAMETER		Jan-93 PARAMETER		Apr-93 PARAMETER		Aug-93 PARAMETER		Nov-93 PARAMETER		Apr-94 PARAMETER		Jan-95 PARAMETER	
SW-01	~~Methylene Chloride~~	17	~~Methylene Chloride~~	15	Total 1,2-DCE	3					Total 1,2-DCE	3			Total 1,2-DCE	3	Acetone	12	Methylene Chloride	1
	1,2-trans-DCE	3.8	1,2-trans-DCE	3.9											Toluene	1			Total 1,2-DCE	2
																			~~TCE~~	4
																			~~Benzene~~	1
																			Toluene	2
																			Chlorobenzene	2
SW-02	~~1,2-DCA~~	5.3	Chlorobenzene	12	Total 1,2-DCE	2	Total 1,2-DCE	1	Total 1,2-DCE	4	1,1,1,-TCA	5			Total 1,2-DCE	2	Acetone	37	Total 1,2-DCE	2
	1,2-trans-DCE	6.7	Chloroform	3.6	TCE	1					Toluene	2							Toluene	1
			1,2-DCA	15							Total Xylenes	1								
			~~Methylene Chloride~~	13							TCE	4								
			Toluene	48																
			1,2-trans-DCE	33																
			1,1,1-TCA	5.5																
SW-03	Chloroform	1.8	Chlorobenzene	8.3	~~PCE~~	2			Total 1,2-DCE	3	1,1,1-TCA	2					Acetone	52	Total 1,2-DCE	3
	~~Methylene Chloride~~	12	Chloroform	3.6					2-Butanone	9	4-Methyl-2-Pentanone	5							Toluene	2
	1,2-trans-DCE	9.6	~~1,2-DCA~~	14					Toluene	2	Total Xylenes	3								
	1,1,1-TCA	13	~~Methylene Chloride~~	6.1							Toluene	1								
			Toluene	21																
			1,2-trans-DCE	35																
			1,1,1-TCA	6.3																
			TCE	3.8																
SW-04	~~Methylene Chloride~~	11	~~Methylene Chloride~~	4.6			Total 1,2-DCE	4	2-Butanone	9	1,1,1-TCA	2	Toluene	1	1,1,1-TCA	1	2-Butanone	55	Total 1,2-DCE	1
	1,2-trans-DCE	8.5									Total Xylenes	3							Toluene	2
	1,1,1-TCA	5.4																		

SAMPLE ID (Location)	SAMPLING DATE																	
	Apr-95 PARAMETER		Jul-95 PARAMETER		Nov-95 PARAMETER		Jan-96 PARAMETER		Apr-96 PARAMETER		Sep-96 PARAMETER		Dec-96 PARAMETER		Feb-97 PARAMETER		Apr-97 PARAMETER		Jul-97 PARAMETER	
SW-01	Total 1,2-DCE	2	~~Methylene Chloride~~	6	Total 1,2-DCE	1	Methylene Chloride	1	Methylene Chloride	2	Methylene Chloride	2	Total 1,2-DCE	2	Acetone	61	Methylene Chloride	1	Methylene Chloride	1
			Acetone	3			Acetone	46			Acetone	10	~~Benzene~~	1	Toluene	1	cis-1,2-DCE	2	Acetone	12
			Total 1,2-DCE	1			PCE	2					Toluene	5	cis-1,2-DCE	2			2-Butanone	3
							Toluene	2					Chlorobenzene	1						
													Xylene	2						
SW-02	Acetone	380	Methylene Chloride	2	~~Vinyl Chloride~~	4	Methylene Chloride	1	Methylene Chloride	2	~~Methylene Chloride~~	7	Acetone	16	Acetone	42	~~Methylene Chloride~~	4	Methylene Chloride	1
			Acetone	10	Total 1,2-DCE	4	Acetone	30	Acetone	11	Acetone	47	Total 1,2-DCE	2	Toluene	1	Toluene	2	Acetone	99
			Toluene	4	Toluene	13	Total 1,2-DCE	4	Total 1,2-DCE	6	Toluene	1	~~Benzene~~	1	cis-1,2-DCE	2	cis-1,2-DCE	3		
			Total Xylenes	1	Chlorobenzene	1	TCE	1	Toluene	7			4-methyl-2-pentanone	3						
					Ethylbenzene	0.5	PCE	1	Total Xylenes	1			Toluene	5						
					Total Xylenes	4	Toluene	3					Xylene	2						
							Total Xylenes	1												
SW-03	Acetone	410	Methylene Chloride	2	~~Vinyl Chloride~~	4	~~Methylene Chloride~~	4	~~Vinyl Chloride~~	8	Methylene Chloride	2	Acetone	29	Acetone	49	~~Vinyl Chloride~~	4	2-Butanone	5
			Acetone	6	Total 1,2-DCE	4	Acetone	39	1,1-DCA	3	Acetone	7	Total 1,2-DCE	2	Toluene	12	~~Methylene Chloride~~	4		
			2-Butanone	1	Toluene	16	1,1-DCA	2	Total 1,2-DCE	22			2-Butanone (MEK)	8	Chlorobenzene	1	Acetone	7		
			Toluene	2	Chlorobenzene	1	Total 1,2-DCE	10	Chloroform	2			Toluene	3	Xylene	2	1,1-DCA	2		
			Total Xylenes	1	Total Xylenes	4	Chloroform	1	1,1,1,-TCA	2			Xylene	1	cis-1,2-DCE	9	Toluene	14		
							1,1,1-TCA	2	Toluene	52							Chlorobenzene	2		
							~~PCE~~	1	Chlorobenzene	4							Xylene	5		
							Toluene	16	Ethylbenzene	2							cis-1,2-DCE	10		
							Total Xylenes	6	Total Xylenes	11										
SW-04	Acetone	600	Methylene Chloride	1	Toluene	2	No Sample		Methylene Chloride	2	Methylene Chloride	2	Acetone	21	Acetone	27	~~Methylene Chloride~~	31	Methylene Chloride	1
			Acetone	8					Acetone	10	Acetone	15	~~Benzene~~	1	Toluene	5	Acetone	23	2-Butanone	6
			2-Butanone	2					2-Butanone (MEK)	14	2-Butanone (MEK)	10	Toluene	2	cis-1,2-DCE	4				
									Toluene	1			Xylene	2						

Notes:
All units in ug/l (parts per billion).
(1) - Pre-IRM VOC analysis method was for priority pollutants which do not include acetone.
*analyte was found in the associated blank as well as in the sample
~~Concentration~~ exceeds Class FW2 surface water quality standard. FW2 (general surface waters not designated in N.J.A.C. 7:9b-1.15(h) to be set aside for posterity) standards are referred to here only for comparison.
FW2 is effectively the most stringent standard outside of waters set aside for posterity, the less stringent SE (the general surface water classification applied to saline waters of estuaries) is likely applicable to Peach Island Creek.

TABLE A-2
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY
SUMMARY OF SURFACE WATER QUALITY DATA
VOLATILE ORGANIC COMPOUNDS

SAMPLE ID (Location)	SAMPLING DATE																			
	Feb-97 PARAMETER		Apr-97 PARAMETER		Jul-97 PARAMETER		Nov-97 PARAMETER		Mar-98 PARAMETER		Apr-98 PARAMETER		Jul-98 PARAMETER		Oct-98 PARAMETER		Mar-99 PARAMETER		Jul-99 PARAMETER	
SW-01	Acetone	61	Methylene Chloride	1	Methylene Chloride	1	Acetone	14	TCE	2							Methylene Chloride	4	2-Butanone	2
	Toluene	1	cis-1,2-DCE	2	Acetone	12	Toluene	1	cis-1,2-DCE	1							Acetone	6		
	cis-1,2-DCE	2			2-Butanone	3	cis-1,2-DCE	1												
SW-02	Acetone	42	Methylene Chloride	4	Methylene Chloride	1	Methylene Chloride	1	Methylene Chloride	1			Methylene Chloride	2	Benzene	7	Methylene Chloride	6	Acetone	17
	Toluene	1	Toluene	2	Acetone	99			Acetone	4					TCE	2	Acetone	7	2-Butanone	8
	cis-1,2-DCE	2	cis-1,2-DCE	3					Toluene	4							Toluene	2		
									Chlorobenzene	1							cis-1,2-DCE	4		
									Xylene	1										
									cis-1,2-DCE	5										
SW-03	Acetone	49	Vinyl Chloride	4	2-Butanone	5	Acetone	7	Methylene Chloride	1	Methylene Chloride	2	Methylene Chloride	1	Benzene	3	Methylene Chloride	6	Acetone	19
	Toluene	12	Methylene Chloride	4			Toluene	6	Acetone	5	Toluene	3					Acetone	13	2-Butanone	10
	Chlorobenzene	1	Acetone	7			Xylene	1	Toluene	1	cis-1,2-DCE	3					Toluene	5	Toluene	2
	Xylene	2	1,1-DCA	2			cis-1,2-DCE	1	cis-1,2-DCE	2							Chlorobenzene	1		
	cis-1,2-DCE	9	Toluene	14													Xylene	1		
			Chlorobenzene	2													MIBK	2		
			Xylene	5													Vinyl Chloride	1		
			cis-1,2-DCE	10													cis-1,2-DCE	6		
SW-04	Acetone	27	Methylene Chloride	31	Methylene Chloride	1	Methylene Chloride	1	Methylene Chloride	1			Methylene Chloride	2			Methylene Chloride	4	Acetone	20
	Toluene	5	Acetone	23	2-Butanone	6	Acetone	13	Acetone	5							Acetone	14	2-Butanone	11
	cis-1,2-DCE	4					Toluene	3	cis-1,2-DCE	1							Toluene	6	Toluene	2
																	Chlorobenzene	1		
																	Xylene	2		
																	MIBK	2		
																	Vinyl Chloride	1		
																	cis-1,2-DCE	8		

SAMPLE ID (Location)	SAMPLING DATE													
	Sep-99 PARAMETER		Dec-99 PARAMETER		Mar-00 PARAMETER		May-00 PARAMETER		Aug-00 PARAMETER		Dec-00 PARAMETER		Mar-01 PARAMETER	
SW-01			cis-1,2 DCE	3	Acetone	31							cis-1,2 DCE	1
			Toluene	1										
SW-02			Vinyl Chloride	2	Acetone	7	Toluene	2			Chloromethane	2	cis-1,2 DCE	3
			cis-1,2 DCE	2							cis-1,2 DCE	1	Toluene	2
			Toluene	4										
			Chlorobenzene	1										
SW-03			Chloromethane	1	Acetone	8	Acetone	36*			Methylene Chloride	1	cis-1,2 DCE	3
			Vinyl Chloride	5	cis-1,2-DCE	1	cis-1,2-DCE	1			cis-1,2 DCE	1	Toluene	2
			cis-1,2 DCE	4	2-Butanone	6	Toluene	2						
			1,1-DCA	1										
			Toluene	6										
			Chlorobenzene	2										
			Xylenes	3										
SW-04	Acetone	13	Vinyl Chloride	2	Acetone	10	Acetone	60*			cis-1,2 DCE	2	cis-1,2 DCE	3
	MIBK	4	cis-1,2 DCE	1	cis-1,2-DCE	1	2-Butanone	4					Toluene	2
			Toluene	3	2-Butanone	10	Toluene	1						
			Chlorobenzene	1	Toluene	1								

Notes:
All units in ug/l (parts per billion).
(1) - Pre-IRM VOC analysis method was for priority pollutants which do not include acetone.
*analyte was found in the associated blank as well as in the sample
Concentration exceeds Class FW2 surface water quality standard. FW2 (general surface waters not designated in N.J.A.C. 7:9b-1.15(h) to be set aside for posterity) standards are referred to here only for comparison.
FW2 is effectively the most stringent standard outside of waters set aside for posterity, the less stringent SE (the general surface water classification applied to saline waters of estuaries) is likely applicable to Peach Island Creek.

TABLE A-2
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY
SUMMARY OF SURFACE WATER QUALITY DATA
VOLATILE ORGANIC COMPOUNDS

SAMPLE ID (Location)	SAMPLING DATE																					
	May-01 PARAMETER		Aug-01 PARAMETER		Nov-01 PARAMETER		May-02 PARAMETER		Feb-02 PARAMETER		Jul-02 PARAMETER		Sep-02 PARAMETER		Apr-03 PARAMETER		Jun-03 PARAMETER		Sep-03 PARAMETER		Nov-03 PARAMETER	
SW-01			Acetone	6			Acetone	44	Acetone	10			Chloromethane	0.2	2-butanone	4	cis-1,2-DCE	0.6	PCE	0.4	Vinyl chloride	0.2
							cis-1,2-DCE	1	cis-1,2-DCE	1					Acetone	5	TCE	0.3			MTBE	0.4
							Toluene	0.6							cis-1,2-DCE	1					cis-1,2-DCE	0.4
															TCE	0.5					Chloroform	0.2
															PCE	0.5						
															1,2-Dichlorobenzene	0.1						
SW-02			Acetone	6			Acetone	200	Acetone	12	Toluene	0.3	Chloromethane	0.3	1,2-Dichlorobenzene	0.7	Bromodichloromethane	1				
			Toluene	0.2			cis-1,2-DCE	0.4	cis-1,2-DCE	1					2-Hexanone	2	Chlorobenzene	0.4				
							2-Butanone	5							Acetone	26	Chloroform	3				
							Toluene	3							Chloroform	0.6	cis-1,2-DCE	0.5				
							Chlorobenzene	0.8							cis-1,2-DCE	3	Vinyl chloride	0.3				
															PCE	0.7	Xylene (total)	0.7				
															TCE	0.6						
SW-03			Chloromethane	1			Acetone	91	Acetone	19	Acetone	5	cis-1,2-DCE	0.2	Bromodichloromethane	2	Chloroform	0.3	Chloroform	6	Carbon disulfide	0.2
			Acetone	7			Toluene	1	cis-1,2-DCE	2	Toluene	2	Chloroform	0.2	Chlorobenzene	1			cis-1,2-DCE	0.3	Methyl Acetate	1
			Toluene	0.4					2-Butanone	7	Chlorobenzene	0.5			Chloroform	4			2-butanone	4	Chloroform	11
															cis-1,2-DCE	2			Bromodichloromethane	2	Bromodichloromethane	7
															Methylene Chloride	0.7					Dibromochloromethane	2
															Vinyl chloride	0.5						
															Xylene (total)	1						
SW-04			Toluene	0.4	cis-1,2-DCE	1	Acetone	110	Acetone	20	Acetone	8	cis-1,2-DCE	0.2	2-HEXANONE	2	2-butanone	4	Chloroform	4	Vinyl chloride	0.2
							cis-1,2-DCE	0.4	cis-1,2-DCE	2	2-Hexanone	4			Bromodichloromethane	2	2-hexanone	1	Bromodichloromethane	1	MTBE	0.2
							Toluene	1	2-Butanone	7	Toluene	0.6			Chloroform	4	Chloroform	0.5	Chlorobenzene	0.3	cis-1,2-DCE	0.3
							Chlorobenzene	0.6			Chlorobenzene	0.5			cis-1,2-DCE	0.7					Chloroform	3
															Methylene Chloride	0.6					Bromodichloromethane	1
																					Chlorobenzene	0.3

Notes:
All units in ug/l (parts per billion).
(1) - Pre-IRM VOC analysis method was priority pollutants which does not include acetone.
*analyte was found in the associated blank as well as in the sample
Concentration exceeds Class FW2 surface water quality standard. FW2 (general surface waters not designated in N.J.A.C. 7:9b-1.15(h) to be set aside for posterity) standards are referred to here only for comparison.
FW2 is effectively the most stringent standard outside of waters set aside for posterity, the less stringent SE (the general surface water classification applied to saline waters of estuaries) is likely applicable to Peach Island Creek.

TABLE A-3
216 PATERSON PLANK ROAD SITE
SUMMARY OF GROUNDWATER QUALITY DATA
SHALLOW FILL MONITORING WELLS
SEMI-VOLATILE ORGANIC COMPOUNDS
CARLSTADT, NEW JERSEY

SAMPLE ID	LOCATION	SAMPLING DATES															
		Jun-92 1st O&M		Oct-92 2nd O&M		Jan-93 3rd O&M		Apr-93 4th O&M		Aug-93 5th O&M		Nov-93 6th O&M		Apr-94 7th O&M		Jan-95 8th O&M		Apr-95 9th O&M	
MW-8S	Off-Property	ND		ND		ND		ND		ND		ND		bis(2-ethylhexyl)Phthalate	4	bis(2-Ethylhexyl)Phthalate	2	ND	
MW-9S	Off-Property	2-Methylnaphthalene	12	Fluorene	7	Acenaphthene	5	2-Methylnaphthalene	3	2-Methylnaphthalene	7	Naphthalene	2	2-Methylnaphthalene	4	Acenaphthene	10	2-Methylnaphthalene	7
		Acenaphthene	14	Naphthalene	1	2-Methylnaphthalene	3	Acenaphthylene	4	Acenaphthene	11	2-Methylnaphthalene	14	Acenaphthene	6	Dibenzofuran	6	Acenaphthene	11
		Dibenzofuran	11	Acenaphthene	10	4-Chlorophenyl-phenylether	3	bis(2-ethylhexyl)Phthalate	4	Dibenzofuran	8	Acenaphthene	15	Dibenzofuran	4	Fluorene	6	bis(2-Ethylhexyl)Phthalate	4
		Diethylphthalate	19	2-Methylnaphthalene	9	Dibenzofuran	3	Dibenzofuran	2	Fluorene	8	Dibenzofuran	12	Fluorene	4	Phenanthrene	3	Dibenzofuran	7
		Dimethylphthalate	7	Dibenzofuran	7	Phenanthrene	2	Fluorene	2	Naphthalene	2	Fluorene	12	Naphthalene	0.9	Fluoranthene	1	Fluoranthene	1
		Fluorene	11	Phenanthrene	6			Naphthalene	1	Phenanthrene	7	Phenanthrene	11	Phenanthrene	3	bis(2-Ethylhexyl)Phthalate	4	Fluorene	6
		Naphthalene	2					Phenanthrene	0.8			Fluoranthene	1					Phenanthrene	2
		Phenanthrene	9																
MW-10S	Off-Property	ND		ND		ND		ND		ND		bis(2-ethylhexyl)Phthalate	11	ND		bis(2-Ethylhexyl)Phthalate	5	ND	
MW-11S	Off-Property	~~bis(2-ethylhexyl)Phthalate~~	~~66~~	ND		ND		ND		ND		ND		ND		bis(2-Ethylhexyl)Phthalate	2	bis(2-Ethylhexyl)Phthalate	14
		Di-n-Octophthalate	5															Di-n-butylphthalate	2
MW-12S	Off-Property	Diethylphthalate	7	ND		ND		ND		ND		ND		ND		Di-n-butylphthalate	2	ND	
		Dimethylphthalate	3																

SAMPLE ID	LOCATION	SAMPLING DATES															
		Apr-96 13th O&M		Sep-96 14th O&M		Nov-97 19th O&M		Oct-98 23rd O&M		Dec-99 27th O&M		Dec-00 28th O&M		Nov-01 29th O&M		Sep-02 30th O&M		Nov-03 31st O&M	
MW-8S	Off-Property	bis(2-Ethylhexyl)Phthalate	5	ND		bis(2-Ethylhexyl)Phthalate	2	ND		ND		bis(2-Ethylhexyl)phthalate	2	ND		ND		ND	
MW-9S	Off-Property	Phenol	2	Anthracene	2	Dibenzofuran	9	Anthracene	1	2-Methylnaphthalene	7.8	2-Methylnaphthalene	8	Anthracene	1	Anthracene	2	Fluoranthene	2
		2-Methylnaphthalene	4	Fluoranthene	1	Phenanthrene	7	Fluoranthene	1	Anthracene	1.2	Fluorene	9	Fluoranthene	2	Fluoranthene	2		
		Acenaphthene	5			Fluoranthene	0.7			Fluoranthene	1.2	Phenanthrene	6	Pyrene	0.9	Pyrene	1		
		Dibenzofuran	4									Anthracene	1						
		Fluorene	4									Fluoranthene	1						
		Phenanthrene	5									bis(2-Ethylhexyl)phthalate	1						
		Di-n-butylphthalate	0.7																
		Fluoranthene	0.8																
		Pyrene	0.5																
		bis(2-Ethylhexyl)Phthalate	7																
MW-10S	Off-Property	2-Methylphenol	2	Di-n-butylphthalate	1	bis(2-Ethylhexyl)Phthalate	2	ND		ND		bis(2-Ethylhexyl)phthalate	2	Pyrene	0.2	Acenaphthene	0.4	ND	
		4-Methylphenol	4													Fluoranthene	0.2		
		bis(2-Ethylhexyl)Phthalate	1													Pyrene	0.2		
																bis(2-ethylhexyl)phthalate	0.9		
MW-11S	Off-Property	bis(2-Ethylhexyl)Phthalate	1	Phenol	2	Phenol	2	ND		ND		ND		Fluoranthene	0.5	ND		ND	
				4-Methylphenol	1									Pyrene	0.3				
														Butylbenzylphthalate	0.2				
														~~Benzo(a)pyrene~~	~~0.2~~				
MW-12S	Off-Property	bis(2-Ethylhexyl)Phthalate	2	ND		ND		ND		ND		ND		ND		Hexachlorocyclopentadiene	10	ND	
																2,4-Dinitrophenol	25		

All units are in ug/l

~~Concentration~~ exceeds Class II-A Groundwater Quality Standards. Class II-A standards are referred to here for comparison purposes only. Class II-A is effectively the most stringent standard and the hydrogeologic setting of the shallow fill is such that less stringent Class III-B standards would likely apply.

TABLE A-4
216 PATERSON PLANK ROAD SITE
SUMMARY OF SURFACE WATER QUALITY DATA
SEMI-VOLATILE ORGANIC COMPOUNDS
CARLSTADT, NEW JERSEY

SAMPLE ID	LOCATION	SAMPLING DATA								
		Jun-92 1st O&M	Oct-92 2nd O&M	Jan-93 3rd O&M	Apr-93 4th O&M	Aug-93 5th O&M	Nov-93 6th O&M	Apr-94 7th O&M	Jan-95 8th O&M	Apr-95 9th O&M
SW-01	Off-Property	ND	ND	ND	ND	ND	bis(2-ethylhexyl)Phthalate 4	ND	ND	ND
SW-02	Off-Property	ND	ND	bis(2-ethylhexyl)Phthalate 10	bis(2-ethylhexyl)Phthalate 19	ND	ND	bis(2-ethylhexyl)Phthalate 3	ND	ND
SW-03	Off-Property	ND	ND	bis(2-ethylhexyl)Phthalate 4	bis(2-ethylhexyl)Phthalate 2	ND	ND	ND	ND	ND
SW-04	Off-Property	ND	ND	bis(2-ethylhexyl)Phthalate 2	ND	ND	ND	ND	ND	bis(2-Ethylhexyl)Phthalate 3

SAMPLE ID	LOCATION	SAMPLING DATA								
		Apr-96 13th O&M	Sep-96 14th O&M	Nov-97 19th O&M	Oct-98 23rd O&M	Dec-99 27th O&M	Dec-00 28th O&M	Nov-01 29th O&M	Sep-02 30th O&M	Nov-03 31st O&M
SW-01	Off-Property	bis(2-Ethylhexyl)F 2	ND	ND	ND	ND	ND	2,4-Dinitrophenol 25	bis(2-ethylhexyl)F 4	ND
SW-02	Off-Property	ND	ND	ND	ND	ND	ND	2,4-Dinitrophenol 25	ND	ND
SW-03	Off-Property	Pyrene 1 bis(2-Ethylhexyl)F 2	ND	bis(2-Ethylhexyl)Phthalate 1	ND	ND	bis(2-Ethylhexyl)phthalate 2	bis(2-Ethylhexyl)phthalate 0.8	ND	4-Methylphenol 5 Diethylphthalate 5 Phenanthrene 2
SW-04	Off-Property	bis(2-Ethylhexyl)F 1	ND	bis(2-Ethylhexyl)Phthalate 1	ND	ND	bis(2-Ethylhexyl)phthalate 2	bis(2-ethylhexyl)Phthalate 4	ND	ND

All units in ug/l.

Concentration exceeds Class FW2 surface water quality standard. FW2 (general surface waters not designated in N.J.A.C. 7:9b-1.15(h) to be set aside for posterity) standards are referred to here only for comparison.
FW2 is effectively the most stringent standard outside of waters set aside for posterity, the less stringent SE (the general surface water classification applied to saline waters of estuaries) is likely applicable to Peach Island Creek.

TABLE A-5
216 PATERSON PLANK ROAD SITE
SUMMARY OF GROUNDWATER QUALITY DATA
SHALLOW FILL MONITORING WELLS
PCBs / PESTICIDES
CARLSTADT, NEW JERSEY

SAMPLE ID	LOCATION	SAMPLING DATA								
		Jun-92 1st O&M	Oct-92 2nd O&M	Jan-93 3rd O&M	Apr-93 4th O&M	Aug-93 5th O&M	Nov-93 6th O&M	Apr-94 7th O&M	Jan-95 8th O&M	Apr-96 13th O&M
MW-8S	Off-Property	ND	ND	ND	ND	ND	ND	ND		Heptachlor Epoxide 0.01
MW-9S	Off-Property	ND	ND	ND	ND	ND	ND	ND		delta-BHC 0.00
MW-10S	Off-Property	ND	ND	ND	ND	ND	ND	ND		delta-BHC 0.00
MW-11S	Off-Property	ND	ND	ND	ND	ND	ND	ND	gamma-BHC (Lindane) 0.002 Dieldrin 0.007 Endrin 0.012 Endosulfan II 0.003 4,4'-DDD 0.007 4,4'-DDT 0.007 Methoxychlor 0.007	
MW-12S	Off-Property	ND	ND	ND	ND	ND	ND	ND		

SAMPLE ID	LOCATION	SAMPLING DATA								
		Sep-96 14th O&M	Nov-97 19th O&M	Oct-98 23rd O&M	Dec-99 27th O&M	Dec-00 28th O&M	Nov-01 29th O&M	Sep-02 30th O&M	Nov-03 31st O&M	
MW-8S	Off-Property		4,4'-DDT 0.01 4,4'-DDE 0.02 delta-BHC 0.03 beta-BHC 0.04 Heptachlor Epoxide 0.05	delta-BHC 0.06	4,4'-DDD 0.02 Alpha chlordane 0.04 p,p'-Methoxychlor 0.11		beta-BHC 0.06			
MW-9S	Off-Property		gamma-BHC (Lindane) 0.00 Endosulfan I 0.01 alpha-BHC 0.01 Methoxychlor 0.01 delta-BHC 0.03	beta-BHC 0.10	gamma-BHC (Lindane) 0.02				delta-BHC 0.02	
MW-10S	Off-Property	delta-BHC 0.003	alpha-BHC 0.01 delta-BHC 0.02		Endrin aldehyde 0.01 Endrin 0.03 gamma-BHC (Lindane) 0.06					
MW-11S	Off-Property	Aldrin 0.00 Heptachlor 0.00 4,4'-DDT 0.01	Dieldrin 0.00 Endrin 0.01 4,4'-DDE 0.01 delta-BHC 0.02		Heptachlor epoxide 0.01 gamma-BHC (Lindane) 0.01 Endrin aldehyde 0.01 Delta-BHC 0.02					
MW-12S	Off-Property	Dieldrin 0.004	Endrin Ketone 0.008 4,4'-DDE 0.01 delta-BHC 0.02		Gamma chlordane 0.006 Heptachlor epoxide 0.01 gamma-BHC (Lindane) 0.01 p,p'-Methoxychlor 0.018 Beta-BHC 0.030					

All units in ug/l

Concentration exceeds Class II-A Groundwater Quality Standards. Class II-A standards are referred to here for comparison purposes only. Class II-A is effectively the most stringent standard and the hydrogeologic setting of the shallow fill is such that less stringent Class III-B standards would likely apply.

TABLE A-6
216 PATERSON PLANK ROAD SITE
SUMMARY OF SURFACE WATER QUALITY DATA
PCBs/ PESTICIDES
CARLSTADT, NEW JERSEY

SAMPLE ID	LOCATION	SAMPLING DATES								
		Jun-92 1st O&M	Oct-92 2nd O&M	Jan-93 3rd O&M	Apr-93 4th O&M	Aug-93 5th O&M	Nov-93 6th O&M	Apr-94 7th O&M	Jan-95 8th O&M	Apr-96 13th O&M
SW-01	Off-Property	ND		ND	ND	ND	ND	ND	Heptachlore Epoxide 0.0170 Dieldrin 0.0059 4,4'-DDD 0.0073 Endosulfan sulfate 0.0038 4,4'-DDT 0.0043 Endrin aldehyde 0.0059	delta-BHC 0.0041
SW-02	Off-Property	ND		ND	ND	ND	ND	ND	Alpha-BHC 0.0011 gamma-BHC (Lindane) 0.0021 Dieldrin 0.0063 Endrin 0.0024 4,4'-DDD 0.0180	delta-BHC 0.0069
SW-03	Off-Property	ND	4,4'-DDD 0.13	ND	ND	ND	ND	ND	Dieldrin 0.0041 Endrin 0.0023 4,4'-DDD 0.0310 Gamma chlordane 0.0017	
SW-04	Off-Property	ND	ND	ND	ND	ND	ND	ND	Gamma chlordane 0.0110 4,4'-DDE 0.0043 4,4'-DDD 0.0050	delta-BHC 0.0092

SAMPLE ID	LOCATION	SAMPLING DATES					
		Nov-97 19th O&M	Dec-99 27th O&M	Dec-00 28th O&M	Nov-01 29th O&M	Sep-02 30th O&M	Nov-03 31st O&M
SW-01	Off-Property	Endrin 0.0039 Methoxychlor 0.0064 Heptachlor Epoxide 0.0068 4,4'-DDT 0.0093 delta-BHC 0.0160	Gamma chlordane 0.0023 Endrin 0.0039 Heptachlor epoxide 0.0064 4,4'-DDD 0.0068 Endrin aldehyde 0.0077 4,4'-DDE 0.0130 Endosulfan sulfate 0.0130	ND	ND	ND	ND
SW-02	Off-Property	4,4'-DDE 0.0066 4,4'-DDT 0.0090 delta-BHC 0.0200	Dieldrin 0.0140 Endrin ketone 0.0140 gamma-BHC (Lindane) 0.0180 Delta-BHC 0.0200 p,p'-Methoxychlor 0.0280				
SW-03	Off-Property	Heptachlor Epoxide 0.0036 4,4'-DDT 0.0072 delta-BHC 0.0170	Alpha-BHC 0.0041 4,4'-DDE 0.0061 4,4'-DDD 0.0082 Delta-BHC 0.0084 gamma-BHC (Lindane) 0.0110	ND	ND	Aroclor-1254 0.3600	ND
SW-04	Off-Property	4,4'-DDT 0.0075 Methoxychlor 0.0098 gamma-BHC (Lindane) 0.0140 delta-BHC 0.0340	Delta-BHC 0.0012 gamma-BHC (Lindane) 0.0130 Heptachlor epoxide 0.0150 p,p'-Methoxychlor 0.0230	Heptachlor epoxide 0.0230	ND	ND	ND
			Dieldrin 0.0041 Endrin ketone 0.0041 Endosulfan sulfate 0.0049 Gamma chlordane 0.0091 4,4'-DDE 0.0098 gamma-BHC (Lindane) 0.0120 Delta-BHC 0.0130	Gamma chlordane 0.0130	ND	ND	Heptachlor 0.0500

*analyte was found in the associated blank as well as in the sample

Concentration exceeds Class FW2 surface water quality standard. FW2 (general surface waters not designated in N.J.A.C. 7:9b-1.15(h) to be set aside for posterity) standards are referred to here only for comparison.
FW2 is effectively the most stringent standard outside of waters set aside for posterity, the less stringent SE (the general surface water classification applied to saline waters of estuaries) is likely applicable to Peach Island Creek.

TABLE A-7
216 PATERSON PLANK ROAD SITE
SUMMARY OF GROUNDWATER QUALITY DATA
SHALLOW FILL MONITORING WELLS
METALS

SAMPLE ID	LOCATION	SAMPLING DATES																	
		Jun-92 1st O&M		Oct-92 2nd O&M		Jan-93 3rd O&M		Apr-93 4th O&M		Aug-93 5th O&M		Nov-93 6th O&M		Apr-94 7th O&M		Jan-95 8th O&M		Apr-95 9th O&M	
MW-8S	Off-Property	Aluminum	15800	Aluminum	15300	Aluminum	1850	Aluminum	19900	Aluminum	4720	Aluminum	8980	Aluminum	19100	Aluminum	11400	Aluminum	3380
		Arsenic	26.7	Arsenic	37.2	Arsenic	17.3	Arsenic	22	Arsenic	10.4	Arsenic	38.9	Arsenic	25.4	Antimony	2.2	Arsenic	3.8
		Barium	456	Barium	332	Barium	357	Barium	444	Barium	179	Barium	489	Barium	638	Arsenic	38.8	Barium	536
		Calcium	124000	Calcium	91400	Calcium	120000	Cadmium	12.9	Cadmium	3.1	Beryllium	0.53	Beryllium	0.34	Barium	889	Cadmium	15.5
		Chromium	39.3	Chromium	48.1	Copper	30.4	Calcium	125000	Calcium	69300	Cadmium	17.8	Cadmium	12.7	Cadmium	5.8	Calcium	120000
		Cobalt	6.4	Cobalt	6.54	Iron	6520	Chromium	50.6	Chromium	173	Calcium	137000	Calcium	214000	Calcium	184000	Chromium	31.6
		Copper	197	Copper	200	Lead	22.4	Cobalt	9.1	Copper	71.2	Chromium	125	Chromium	42	Chromium	30.5	Cobalt	2.5
		Iron	24900	Iron	24900	Magnesium	36900	Copper	374	Iron	6650	Cobalt	3.6	Cobalt	3.3	Cobalt	2.5	Copper	376
		Lead	53.2	Lead	59.1	Manganese	3120	Iron	28700	Lead	18.7	Copper	167	Copper	189	Copper	95.6	Iron	25600
		Magnesium	71600	Magnesium	53000	Nickel	15.8	Lead	87.6	Magnesium	32100	Iron	33700	Iron	23300	Iron	48600	Lead	76.5
		Manganese	2960	Manganese	1710	Potassium	12500	Magnesium	62800	Manganese	984	Lead	41.7	Lead	41.6	Lead	25.7	Magnesium	54700
		Mercury	0.59	Nickel	38.5	Sodium	173000	Manganese	2640	Nickel	86.5	Magnesium	54200	Magnesium	38700	Magnesium	52400	Manganese	4630
		Nickel	28	Potassium	23500	Zinc	67.3	Mercury	0.57	Potassium	12500	Manganese	2350	Manganese	3090	Manganese	5780	Mercury	0.58
		Potassium	28000	Sodium	359000			Nickel	25.8	Sodium	208000	Mercury	0.21	Mercury	0.14	Mercury	0.43	Nickel	18.3
		Silver	3.3	Vanadium	40.2			Potassium	17700	Vanadium	17	Nickel	64.3	Nickel	22.3	Nickel	18.5	Potassium	31200
		Sodium	458000	Zinc	190			Sodium	383000			Potassium	21200	Potassium	15300	Potassium	24200	Sodium	370000
		Vanadium	37.2					Vanadium	55.3			Sodium	320000	Sodium	266000	Sodium	199000	Vanadium	13.9
		Zinc	175					Zinc	215			Vanadium	27.6	Vanadium	18.2	Vanadium	17.4	Zinc	169
												Zinc	173	Zinc	124				
MW-9S	Off-Property	Arsenic	6.8	Aluminum	1340	Aluminum	1670	Aluminum	3340	Aluminum	1600	Aluminum	996	Aluminum	3580	Aluminum	1250	Aluminum	3380
		Barium	475	Arsenic	9.05	Barium	394	Arsenic	4.6	Arsenic	5	Arsenic	5.1	Arsenic	2.7	Antimony	3.1	Arsenic	3.8
		Calcium	103000	Barium	505	Cadmium	4.4	Barium	369	Barium	733	Barium	488	Barium	565	Barium	413	Barium	536
		Chromium	10.4	Calcium	129000	Calcium	147000	Calcium	143000	Calcium	148000	Calcium	118000	Beryllium	0.25	Cadmium	5.4	Cadmium	15.5
		Copper	103	Chromium	22.5	Copper	228	Chromium	31.8	Chromium	20.6	Chromium	16.7	Cadmium	20.6	Calcium	97900	Calcium	120000
		Iron	15300	Copper	151	Iron	18600	Copper	412	Copper	107	Cobalt	2	Calcium	151000	Chromium	14.8	Chromium	31.6
		Lead	51.8	Iron	19400	Lead	84.2	Iron	25900	Iron	23600	Copper	108	Chromium	29	Cobalt	0.88	Cobalt	2.5
		Magnesium	42200	Lead	41.7	Magnesium	507000	Lead	113	Lead	28	Iron	19000	Copper	414	Copper	141	Copper	376
		Manganese	4440	Magnesium	59900	Manganese	3670	Magnesium	52400	Magnesium	65100	Lead	21.9	Iron	23800	Iron	18300	Iron	25600
		Mercury	0.36	Manganese	4940	Mercury	0.99	Manganese	3870	Manganese	5680	Magnesium	47300	Lead	86.8	Lead	27.5	Lead	76.5
		Nickel	10.5	Nickel	12.3	Nickel	9.1	Mercury	0.51	Potassium	32600	Manganese	4440	Magnesium	54400	Magnesium	47700	Magnesium	54700
		Potassium	22100	Potassium	24200	Potassium	19000	Nickel	12.1	Sodium	564000	Mercury	0.17	Manganese	4870	Manganese	3810	Manganese	4630
		Sodium	348000	Sodium	473000	Sodium	386000	Potassium	20400	Vanadium	7.9	Nickel	11.7	Mercury	0.43	Mercury	0.28	Mercury	0.58
		Vanadium	6	Vanadium	8.06	Zinc	241	Sodium	404000			Potassium	21200	Nickel	22.6	Nickel	13.4	Nickel	18.3
		Zinc	79	Zinc	63.9			Vanadium	16.2			Sodium	374000	Potassium	20500	Potassium	29200	Potassium	31200
								Zinc	216					Sodium	429000	Sodium	325000	Sodium	370000
														Vanadium	12.8	Vanadium	7.4	Vanadium	13.9
														Zinc	195	Zinc	63.9	Zinc	169

TABLE A-7
216 PATERSON PLANK ROAD SITE
SUMMARY OF GROUNDWATER QUALITY DATA
SHALLOW FILL MONITORING WELLS
METALS

SAMPLE ID	LOCATION	SAMPLING DATES																	
		Jun-92 1st O&M		Oct-92 2nd O&M		Jan-93 3rd O&M		Apr-93 4th O&M		Aug-93 5th O&M		Nov-93 6th O&M		Apr-94 7th O&M		Jan-95 8th O&M		Apr-95 9th O&M	
MW-10S	Off-Property	Aluminum	2240	Aluminum	3110	Aluminum	1630	Barium	88.9	Aluminum	3610	Aluminum	890	Aluminum	1140	Aluminum	1810	Aluminum	912
		Arsenic	4.8	Antimony	29.2	Arsenic	6.5	Calcium	389000	Antimony	39.7	Arsenic	17.5	Barium	120	Antimony	8.2	Antimony	15.8
		Barium	455	Arsenic	26.2	Barium	90.7	Chromium	21.8	Arsenic	16.8	Barium	637	Beryllium	0.51	Arsenic	6.6	Arsenic	8.6
		Calcium	305000	Barium	766	Calcium	403000	Copper	22	Barium	303	Beryllium	0.48	Calcium	408000	Barium	402	Barium	305
		Chromium	338	Calcium	289000	Chromium	492	Cyanide	5	Beryllium	0.36	Calcium	348000	Chromium	22.7	Cadmium	2.4	Cadmium	2.1
		Iron	1870	Chromium	2390	Copper	20.6	Iron	664	Cadmium	2.8	Chromium	378	Cobalt	3.1	Calcium	343000	Calcium	344000
		Magnesium	130000	Copper	14.7	Iron	1330	Magnesium	96400	Calcium	364000	Cobalt	2.5	Iron	408	Chromium	753	Chromium	1960
		Manganese	1690	Iron	3900	Lead	16.9	Manganese	464	Chromium	456	Iron	1110	Magnesium	116000	Cobalt	1.2	Cobalt	3.9
		Nickel	83.6	Lead	29.6	Magnesium	94900	Nickel	16.5	Copper	37.2	Lead	6.2	Manganese	529	Copper	18	Copper	25.8
		Potassium	41300	Magnesium	133000	Manganese	936	Potassium	32100	Iron	1570	Magnesium	141000	Nickel	39.5	Iron	959	Iron	3640
		Sodium	677000	Manganese	1050	Nickel	202	Sodium	340000	Lead	37.4	Manganese	1270	Potassium	31000	Lead	10.2	Lead	8.1
		Vanadium	14.7	Nickel	546	Potassium	35500	Zinc	64.1	Magnesium	133000	Nickel	236	Silver	2.6	Magnesium	118000	Magnesium	132000
				Potassium	41500	Sodium	274000			Manganese	1010	Potassium	48900	Sodium	573000	Manganese	1020	Manganese	1260
				Sodium	710000	Zinc	97.5			Nickel	195	Sodium	731000	Zinc	144	Nickel	102	Nickel	489
				Vanadium	111	Cyanide	4.4			Potassium	46000	Vanadium	87.3			Potassium	59000	Potassium	56100
				Zinc	102					Sodium	636000	Zinc	72.7			Sodium	499000	Sodium	521000
										Vanadium	92.9					Vanadium	13.2	Vanadium	17.1
										Zinc	183					Zinc	57.3	Zinc	135
MW-11S	Off-Property	Aluminum	5350	Aluminum	334	Aluminum	832	Aluminum	2660	Aluminum	3790	Aluminum	8970	Aluminum	14800	Aluminum	10400	Aluminum	20200
		Arsenic	6.1	Arsenic	10.2	Barium	82.9	Arsenic	3.4	Barium	143	Arsenic	8.3	Arsenic	5.8	Antimony	13.1	Antimony	2.7
		Barium	151	Barium	103	Calcium	209000	Barium	94.5	Beryllium	0.4	Barium	158	Barium	236	Arsenic	9.6	Arsenic	10.4
		Calcium	227000	Calcium	288000	Copper	40.5	Cadmium	3.8	Calcium	352000	Beryllium	0.92	Beryllium	1.2	Barium	190	Barium	210
		Chromium	23.4	Chromium	4.59	Iron	245	Calcium	183000	Chromium	19.4	Cadmium	2.5	Calcium	318000	Beryllium	0.36	Beryllium	1.6
		Copper	35.4	Cobalt	5.19	Lead	42.3	Chromium	15.2	Copper	19.9	Calcium	312000	Chromium	324	Cadmium	0.81	Cadmium	3.3
		Iron	8200	Iron	953	Magnesium	25700	Cyanide	17.6	Iron	3300	Chromium	53	Cobalt	12.9	Calcium	258000	Calcium	248000
		Lead	23.5	Magnesium	31200	Manganese	3230	Iron	4210	Lead	10.7	Cobalt	10.6	Copper	55.4	Chromium	1900	Chromium	397
		Magnesium	25100	Manganese	4150	Mercury	1.6	Magnesium	18400	Magnesium	34500	Copper	35.5	Iron	21100	Cobalt	7.6	Cobalt	23
		Manganese	4080	Nickel	7.93	Nickel	8.1	Manganese	2490	Manganese	5140	Iron	16400	Lead	93.1	Copper	57.9	Copper	87.8
		Mercury	0.6	Potassium	12200	Potassium	8480	Potassium	7270	Potassium	11800	Lead	64.1	Magnesium	33900	Iron	16900	Iron	21700
		Nickel	7.3	Sodium	87300	Sodium	66300	Sodium	520000	Silver	3	Magnesium	33100	Manganese	4440	Lead	46.5	Lead	127
		Potassium	9690	Vanadium	16.6	Zinc	76.2	Vanadium	13.3	Sodium	75900	Manganese	3960	Mercury	2.3	Magnesium	30700	Magnesium	28300
		Sodium	52000							Vanadium	8.4	Mercury	1.5	Nickel	112	Manganese	3500	Manganese	4540
		Vanadium	14.2									Nickel	47.2	Potassium	10500	Mercury	1.2	Mercury	2.1
												Potassium	10400	Silver	2	Nickel	85.9	Nickel	216
												Sodium	67700	Sodium	102000	Potassium	14200	Potassium	13100
												Vanadium	41.4	Vanadium	41.9	Sodium	82600	Selenium	4.7
												Zinc	100	Zinc	107	Vanadium	39.2	Sodium	83300
																Zinc	100	Vanadium	66.2
																		Zinc	324

TABLE A-7
216 PATERSON PLANK ROAD SITE
SUMMARY OF GROUNDWATER QUALITY DATA
SHALLOW FILL MONITORING WELLS
METALS

SAMPLE ID	LOCATION	SAMPLING DATES																	
		Jun-92 1st O&M		Oct-92 2nd O&M		Jan-93 3rd O&M		Apr-93 4th O&M		Aug-93 5th O&M		Nov-93 6th O&M		Apr-94 7th O&M		Jan-95 8th O&M		Apr-95 9th O&M	
MW-12S	Off-Property	Barium	15.5	Aluminum	440	Aluminum	516	Aluminum	8120	Aluminum	40000	Aluminum	1560	Aluminum	5560	Aluminum	4140	Aluminum	32900
		Calcium	38500	Barium	26.6	Calcium	37600	Barium	49.1	Arsenic	3.5	Barium	19.5	Barium	43.5	Barium	47.8	Arsenic	7.2
		Chromium	3.9	Calcium	52400	Iron	840	Calcium	26400	Barium	208	Calcium	28800	Calcium	32500	Calcium	50700	Barium	202
		Copper	8.6	Chromium	3.1	Magnesium	6210	Chromium	33.1	Beryllium	1.2	Chromium	12.1	Chromium	20.5	Chromium	21.9	Beryllium	1.4
		Iron	858	Iron	749	Manganese	131	Cobalt	4.7	Calcium	46200	Copper	11.3	Cobalt	4.3	Cobalt	3.6	Cadmium	3.1
		Lead	7.8	Magnesium	9290	Nickel	5.8	Cyanide	50.8	Chromium	399	Iron	1810	Copper	34.3	Copper	38.4	Calcium	48100
		Magnesium	6260	Manganese	642	Potassium	4000	Iron	12380	Cobalt	36.2	Lead	5.9	Iron	6850	Iron	7330	Chromium	132
		Manganese	278	Nickel	5.53	Sodium	10200	Lead	38.9	Copper	241	Magnesium	4440	Magnesium	6650	Lead	24.9	Cobalt	23.7
		Mercury	0.21	Potassium	5830	Zinc	53.9	Magnesium	8190	Iron	57900	Manganese	168	Manganese	234	Magnesium	8350	Copper	221
		Nickel	12.5	Sodium	18400			Manganese	224	Lead	122	Nickel	8.5	Mercury	0.3	Manganese	722	Iron	48900
		Potassium	4120	Vanadium	4.42			Mercury	0.66	Magnesium	24700	Potassium	5000	Potassium	3840	Mercury	0.21	Lead	176
		Sodium	17900					Nickel	21.4	Manganese	1770	Sodium	9080	Sodium	16200	Nickel	17.2	Magnesium	17200
		Vanadium	2.4					Potassium	3170	Mercury	2.9			Vanadium	15.6	Potassium	5930	Manganese	915
								Sodium	7860	Nickel	331			Zinc	66.3	Sodium	8860	Mercury	1.9
								Vanadium	23.9	Potassium	7660					Vanadium	13.8	Nickel	109
								Zinc	103	Silver	3					Zinc	62.5	Potassium	6240
										Sodium	13400							Selenium	5.8
										Vanadium	110							Sodium	8530
										Zinc	393							Vanadium	95.1
																		Zinc	611

All units in ug/l.

Concentration exceeds Class II-A Groundwater Quality Standards. Class II-A standards are referred to here for comparison purposes only. Class II-A is effectively the most stringent standard and the hydrogeologic setting of the shallow fill is such that less stringent Class III-B standards would likely apply.

TABLE A-7
216 PATERSON PLANK ROAD SITE
SUMMARY OF GROUNDWATER QUALITY DATA
SHALLOW FILL MONITORING WELLS
METALS

SAMPLE ID	LOCATION	SAMPLING DATES																			
		Apr-96 13th O&M		Sep-96 14th O&M		Nov-97 19th O&M		Oct-98 23rd O&M		Dec-99 27th O&M		Dec-00 28th O&M		Nov-01 29th O&M		Sep-02 30th O&M		Nov-03 31st O&M	
MW-8S	Off-Property	Beryllium	0.74	Cadmium	0.77	Beryllium	0.58	Cadmium	2.2	Beryllium	0.85	Beryllium	0.26	Cadmium	2.3	Cadmium	0.82	Beryllium	0.36
		Cobalt	2.1	Vanadium	1.3	Cobalt	2.3	Lead	2.9	Silver	0.93	Cadmium	1.8	Cobalt	3.5	Cobalt	1.1	Silver	1.6
		Cadmium	2.4	Cobalt	1.7	Vanadium	3.2	Vanadium	2.9	Cobalt	6.7	Cobalt	3.1	Vanadium	18.7	Selenium	2.4	Selenium	3.4
		Cyanide	10	Copper	7.5	Antimony	3.8	Cobalt	3.2			Vanadium	13.8	Nickel	39.5	Vanadium	9	Cadmium	3.8
		Vanadium	10.5	Chromium	7.6	Chromium	8.4	Selenium	4			Nickel	36.4	Potassium	38200	Lead	21.7	Cobalt	4.9
		Nickel	34.6	Nickel	15.5	Nickel	10.5	Thallium	4.9			Chromium	73.5			Nickel	26.7	Antimony	8.5
		Zinc	66.8	Zinc	19.1	Copper	23.2	Silver	7.5			Potassium	32000			Iron	23600	Vanadium	40.2
				Aluminum	146			Copper	17.5							Potassium	41700	Barium	910
				Potassium	23800			Chromium	50							Sodium	496000	Potassium	33900
								Aluminum	117										
								Potassium	23700										
MW-9S	Off-Property	Beryllium	0.57	Cadmium	1.3	Beryllium	0.54	Cobalt	0.95	Mercury	0.19	Mercury	0.15	Vanadium	8	Cobalt	0.64	Silver	0.7
		Cadmium	4.8	Thallium	3.3	Vanadium	3.5	Cadmium	1.8	Cadmium	1.7	Beryllium	0.21	Nickel	13.7	Silver	0.99	Cadmium	1.6
		Vanadium	6.7	Vanadium	3.4	Cobalt	4.1	Lead	2.5	Vanadium	4.5	Silver	0.52	Potassium	30000	Antimony	2.4	Vanadium	4.6
		Cyanide	10	Copper	4.3	Copper	7.8	Thallium	3.4	Nickel	5.1	Cobalt	0.7			Cadmium	4.1	Nickel	5.4
		Nickel	14.3	Nickel	4.7	Nickel	24.9	Vanadium	3.4	Chromium	8.7	Cadmium	1.8			Selenium	4.5	Arsenic	6.9
		Zinc	190	Arsenic	5.1			Arsenic	4.2			Selenium	5.2			Vanadium	7.9	Chromium	8.2
				Zinc	13.9			Selenium	4.4			Vanadium	5.6			Nickel	12.8	Barium	519
				Aluminum	140			Nickel	4.6			Chromium	8			Iron	24800	Potassium	19200
				Potassium	43200			Copper	7.7			Thallium	9.2			Potassium	29200		
								Chromium	10.8			Nickel	13.8			Sodium	314000		
								Zinc	10.8			Potassium	22000						
								Aluminum	75.7										
								Potassium	29500										

TABLE A-7
216 PATERSON PLANK ROAD SITE
SUMMARY OF GROUNDWATER QUALITY DATA
SHALLOW FILL MONITORING WELLS
METALS

SAMPLE ID	LOCATION	SAMPLING DATES															
		Apr-96 13th O&M		Sep-96 14th O&M		Nov-97 19th O&M		Oct-98 23rd O&M		Dec-99 27th O&M		Dec-00 28th O&M		Nov-01 29th O&M		Sep-02 30th O&M		Nov-03 31st O&M	
MW-10S	Off-Property	Beryllium	0.56	Cadmium	0.46	Beryllium	0.63	Lead	1.2	Cadmium	1.3	Mercury	0.16	Cobalt	2.6	Lead	1.1	Cadmium	0.25
		Cobalt	1.6	Cobalt	1.7	Cobalt	1	Cobalt	1.9	Cobalt	6.3	Cadmium	0.42	Antimony	11.4	Zinc	4.5	Cobalt	2.4
		Vanadium	1.9	Lead	1.7	Vanadium	2.7	Cadmium	2.3	Vanadium	49.1	Cobalt	2.1	Vanadium	32.9	Antimony	4.6	Antimony	5.2
		Cyanide	10	Vanadium	2.2	Copper	6.1	Arsenic	2.5			Lead	5.2	Potassium	49000	Copper	8.2	Arsenic	6.5
		Nickel	19.1	Arsenic	2.5	Nickel	7.7	Vanadium	3			Vanadium	15.3			Nickel	8.6	Vanadium	17
		Copper	23.9	Copper	8.6			Selenium	3.4			Copper	23.2			Vanadium	10.6	Copper	24.9
		Zinc	109	Nickel	15.8			Thallium	4.2			Chromium	401			Aluminum	94.4	Aluminum	117
		Barium	112	Zinc	24.9			Zinc	6.8			Potassium	54500			Barium	420	Barium	347
				Potassium	81800			Nickel	8.1							Potassium	38500	Potassium	39600
								Copper	8.5										
								Chromium	9.9										
								Aluminum	62										
								Potassium	66700										
MW-11S	Off-Property	Cobalt	3.8			Beryllium	0.59	Beryllium	0.25	Beryllium	0.22	Beryllium	0.47	Cadmium	0.55	Mercury	0.15	Silver	1.2
		Cyanide	10			Cobalt	2.2	Cadmium	1.2	Cobalt	3.1	Cadmium	0.75	Cobalt	5.4	Cobalt	4.4	Thallium	1.7
		Vanadium	13.9			Vanadium	3.4	Vanadium	1.8	Antimony	4.1	Antimony	4.3	Arsenic	5.9	Selenium	7.4	Beryllium	2.1
		Nickel	34.2			Nickel	5.6	Cobalt	2.6	Arsenic	9.7	Cobalt	5.8	Vanadium	12.7	Arsenic	8.1	Selenium	2.8
		Zinc	73.5			Copper	8.6	Copper	8.2	Vanadium	15	Vanadium	31.4	Potassium	17200	Vanadium	16.8	Cadmium	3.2
		Barium	74.1			Zinc	14.4	Nickel	34.2	Nickel	24.2	Barium	146			Barium	200	Cobalt	26.8
						Barium	118	Barium	132	Barium	102	Chromium	306			Iron	10300		
						Aluminum	176	Aluminum	141			Potassium	6390			Potassium	15300		
								Iron	2860							Sodium	380000		
								Potassium	8650										

TABLE A-7
216 PATERSON PLANK ROAD SITE
SUMMARY OF GROUNDWATER QUALITY DATA
SHALLOW FILL MONITORING WELLS
METALS

SAMPLE ID	LOCATION	SAMPLING DATES																	
		Apr-96 13th O&M		Sep-96 14th O&M		Nov-97 19th O&M		Oct-98 23rd O&M		Dec-99 27th O&M		Dec-00 28th O&M		Nov-01 29th O&M		Sep-02 30th O&M		Nov-03 31st O&M	
MW-12S	Off-Property	Beryllium	0.68	Cobalt	0.68	Beryllium	0.57	Beryllium	0.21	Cobalt	6.2	Beryllium	0.24	Cadmium	2	Cobalt	0.98	Cadmium	0.26
		Cobalt	3.6	Lead	1.5	Cobalt	0.95	Cobalt	0.86	Vanadium	19	Cadmium	0.39	Cobalt	17.4	Arsenic	1.4	Cobalt	3.8
		Vanadium	13.1	Vanadium	3.1	Vanadium	2.8	Vanadium	1.5	Nickel	25.7	Arsenic	3.5	Vanadium	48.2	Vanadium	4.7	Vanadium	16
		Nickel	29.5	Nickel	11.1	Copper	7.5	Arsenic	1.9	Barium	77	Selenium	4.8	Barium	167	Nickel	9.2	Nickel	35.7
		Copper	46.2	Copper	11.8	Zinc	13	Lead	2.2	Potassium	4170	Cobalt	5.5	Potassium	3740	Chromium	9.6	Barium	76.1
		Barium	56	Barium	33	Barium	40.4	Chromium	4.2			Thallium	6			Zinc	10.3	Potassium	2260
		Potassium	3500	Zinc	99	Aluminum	169	Nickel	9			Vanadium	17.5			Copper	13.5		
				Aluminum	118	Potassium	4450	Copper	10.3			Nickel	22.1			Barium	36.2		
				Potassium	4070			Barium	51.8			Chromium	38.3			Potassium	2050		
								Aluminum	70.8			Barium	72.8						
								Iron	452			Potassium	3420						
								Potassium	4960										

All units in ug/l.
Concentration exceeds Class II-A Groundwater Quality Standards. Class II-A standards are referred to here for comparison purposes only. Class II-A is effectively the most stringent sta
hydrogeologic setting of the shallow fill is such that less stringent Class III-B standards would likely apply.

TABLE A-8
216 PATERSON PLANK ROAD SITE
SUMMARY OF SURFACE WATER QUALITY DATA
METALS
CARLSTADT, NEW JERSEY

SAMPLE ID	LOCATION	SAMLING DATE																					
		Jul-87 Pre-IRM		Dec-87 Pre-IRM		Jun-92 1st O&M		Oct-92 2nd O&M		Jan-93 3rd O&M		Apr-93 4th O&M		Aug-93 5th O&M		Nov-93 6th O&M		Apr-94 7th O&M		Jan-95 8th O&M	
SW-01	Off-Property	Zinc	39	Mercury	63	Arsenic	3.8	Aluminum	161	Calcium	58700	Aluminum	588	Aluminum	1320	Aluminum	376	Aluminum	1240	Arsenic	3.6
				Copper	16	Barium	27.2	Arsenic	1.85	Iron	474	Barium	36.4	Arsenic	4.4	Barium	41.1	Beryllium	3.8	Manganese	390
						Calcium	34500	Barium	54.1	Magnesium	77400	Calcium	24400	Barium	96.6	Beryllium	0.14	Calcium	59.8	Mercury	0.29
						Chromium	14.4	Calcium	114000	Manganese	510	Chromium	17.5	Beryllium	0.64	Calcium	56000	Chromium	45400	Barium	39.7
						Copper	9.7	Chromium	6.82	Nickel	5.2	Copper	14.1	Calcium	176000	Chromium	7.8	Copper	36.7	Calcium	71600
						Iron	1320	Iron	694	Potassium	25900	Iron	1850	Chromium	10	Copper	9.5	Lead	23.5	Chromium	7
						Lead	14.9	Lead	2.03	Sodium	660000	Magnesium	9480	Copper	16.1	Iron	866	Magnesium	3310	Cobalt	0.69
						Magnesium	33500	Magnesium	221000	Zinc	56.2	Manganese	398	Iron	898	Lead	3.1	Manganese	15700	Copper	7.5
						Manganese	650	Manganese	513			Mercury	1.7	Magnesium	437000	Magnesium	91600	Mercury	665	Iron	618
						Mercury	2.6	Potassium	69600			Potassium	4030	Manganese	818	Manganese	644	Nickel	3.5	Lead	6.8
						Nickel	6.9	Selenium	2.05			Sodium	50800	Potassium	135000	Mercury	0.67	Sodium	6040	Magnesium	130000
						Potassium	13100	Silver	2.46			Zinc	114	Sodium	3610000	Nickel	10	Cobalt	2.2	Nickel	9
						Sodium	299000	Sodium	1960000					Vanadium	3.6	Potassium	30000	Cyanide	117000	Potassium	78300
						Vanadium	4	Vanadium	3.02					Cyanide	14.7	Sodium	853000	Thallium	87.3	Sodium	1000000
						Zinc	75.2	Zinc	37.2							Zinc	635			Vanadium	2.3
								Cyanide	24.6											Zinc	32.8
SW-02	Off-Property	Zinc	63	Chromium	28	Arsenic	4.1	Aluminum	154	Aluminum	139	Aluminum	1180	Aluminum	1400	Aluminum	417	Aluminum	691	Copper	10.4
				Zinc	90	Barium	26.6	Arsenic	2.04	Calcium	58800	Barium	51.2	Arsenic	5.5	Barium	44.4	Beryllium	2.9	Manganese	742
						Calcium	39900	Barium	62.6	Iron	814	Cadmium	5.2	Barium	114	Calcium	54700	Calcium	68.7	Mercury	0.56
						Chromium	10.2	Beryllium	1.03	Magnesium	47500	Calcium	35200	Beryllium	0.54	Chromium	9.5	Chromium	73000	Barium	54.2
						Copper	20.3	Calcium	112000	Manganese	953	Chromium	25.6	Calcium	173000	Copper	11.1	Copper	16.5	Calcium	72900
						Iron	1580	Chromium	10.6	Mercury	0.8	Copper	53.8	Chromium	15.1	Iron	996	Lead	24.8	Chromium	9.9
						Lead	14.2	Iron	772	Nickel	24.4	Iron	3470	Copper	20.6	Lead	2.9	Magnesium	3000	Iron	874
						Magnesium	13000	Lead	2.83	Potassium	15500	Lead	23	Iron	1350	Magnesium	78400	Manganese	17600	Lead	4.9
						Manganese	466	Magnesium	214000	Sodium	388000	Magnesium	9550	Lead	7.3	Manganese	780	Mercury	636	Magnesium	88600
						Mercury	2	Manganese	867	Zinc	130	Manganese	624	Magnesium	389000	Mercury	0.79	Nickel	1.5	Nickel	14.7
						Nickel	11.7	Nickel	4.74			Mercury	3.4	Manganese	1110	Nickel	19.1	Potassium	22.8	Potassium	52500
						Potassium	4000	Potassium	66400			Nickel	25.9	Mercury	1.2	Potassium	25400	Sodium	5640	Sodium	653000
						Sodium	69200	Silver	2.78			Potassium	3540	Potassium	120000	Sodium	719000	Cobalt	2.1	Vanadium	2
						Vanadium	3.4	Sodium	1820000			Sodium	50800	Sodium	3170000	Zinc	103	Cyanide	83600	Zinc	53.2
						Zinc	51.1	Thallium	3.5			Zinc	114	Vanadium	5			Silver	9.6		
								Vanadium	2.31									Thallium	54.1		
								Zinc	52.7												
								Cyanide	12.4												

TABLE A-8
216 PATERSON PLANK ROAD SITE
SUMMARY OF SURFACE WATER QUALITY DATA
METALS
CARLSTADT, NEW JERSEY

SAMPLE ID	LOCATION	SAMLING DATE																					
		Jul-87 Pre-IRM		Dec-87 Pre-IRM		Jun-92 1st O&M		Oct-92 2nd O&M		Jan-93 3rd O&M		Apr-93 4th O&M		Aug-93 5th O&M		Nov-93 6th O&M		Apr-94 7th O&M		Jan-95 8th O&M	
SW-03	Off-Property	Nickel	11	Copper	13	Arsenic	4.4	Aluminum	153	Aluminum	150	Aluminum	873	Aluminum	1670	Aluminum	770	Aluminum	406	Aluminum	66.8
		Zinc	150	Nickel	35	Barium	21	Arsenic	2.22	Barium	77.5	Barium	47.4	Arsenic	5.2	Barium	55.7	Beryllium	2.6	Copper	9.7
				Zinc	82	Calcium	28600	Barium	59.1	Cadmium	6.9	Cadmium	3.5	Barium	127	Cadmium	1.8	Calcium	66.1	Manganese	720
						Chromium	8.2	Calcium	91400	Calcium	82600	Calcium	36800	Beryllium	0.56	Calcium	51900	Chromium	72500	Mercury	0.68
						Copper	14.7	Chromium	7.38	Iron	857	Chromium	18.8	Calcium	170000	Chromium	18.1	Copper	9.4	Barium	50
						Iron	1540	Iron	922	Magnesium	30400	Copper	45.2	Chromium	20.2	Cobalt	2.2	Magnesium	2770	Calcium	61100
						Lead	6.8	Lead	7.07	Manganese	1640	Iron	2870	Copper	32.8	Copper	34	Manganese	17300	Chromium	8.1
						Magnesium	10000	Magnesium	136000	Mercury	0.53	Magnesium	9760	Iron	1820	Iron	1930	Mercury	625	Iron	796
						Manganese	509	Manganese	632	Nickel	180	Manganese	598	Lead	12.8	Lead	14	Nickel	0.82	Lead	3.8
						Mercury	1.2	Nickel	5.57	Potassium	7380	Mercury	2.7	Magnesium	372000	Magnesium	21100	Potassium	22.4	Magnesium	65200
						Nickel	12.3	Potassium	40900	Sodium	189000	Nickel	21.9	Manganese	1200	Manganese	683	Sodium	5370	Nickel	13.2
						Potassium	3770	Sodium	1050000	Zinc	351	Potassium	3590	Mercury	2.1	Mercury	1.6	Cyanide	83000	Potassium	37400
						Sodium	58000	Zinc	38.1			Sodium	50900	Potassium	112000	Nickel	39.5	Thallium	30.1	Sodium	469000
						Vanadium	4					Zinc	78.7	Silver	3.4	Potassium	7180			Vanadium	2.2
						Zinc	29.1							Sodium	3050000	Sodium	132000			Zinc	51.8
														Vanadium	7.1	Zinc	197				
SW-04	Off-Property	Nickel	11	Copper	13	Arsenic	5.1	Aluminum	125	Aluminum	342	Aluminum	862	Aluminum	1260	Aluminum	518	Aluminum	492	Aluminum	193
		Zinc	94	Nickel	49	Barium	20.1	Arsenic	3.15	Barium	98.4	Barium	44.9	Arsenic	8.4	Barium	54.4	Beryllium	3.3	Copper	16.3
				Zinc	130	Calcium	27000	Barium	56.7	Cadmium	16.7	Calcium	26300	Barium	133	Cadmium	1.8	Calcium	62.8	Manganese	792
						Chromium	7.2	Calcium	81600	Calcium	72400	Chromium	22.7	Beryllium	0.43	Calcium	42100	Chromium	53900	Mercury	0.82
						Copper	7.4	Chromium	12	Copper	18	Copper	41.3	Calcium	176000	Chromium	16.8	Copper	17.9	Barium	73.1
						Iron	1580	Iron	1200	Iron	1280	Iron	2960	Chromium	11.8	Cobalt	1.9	Magnesium	3660	Cadmium	0.55
						Lead	4.9	Lead	5.37	Magnesium	34100	Magnesium	8440	Copper	32.6	Copper	29.4	Manganese	14300	Calcium	74800
						Magnesium	9670	Magnesium	85700	Manganese	2350	Manganese	703	Iron	1020	Iron	1780	Mercury	644	Chromium	13.2
						Manganese	500	Manganese	610	Mercury	1.2	Mercury	4.1	Magnesium	251000	Lead	4.8	Nickel	1.3	Cobalt	1
						Mercury	1.3	Nickel	11.2	Nickel	283	Nickel	30.3	Manganese	1010	Magnesium	23400	Potassium	28.4	Iron	1350
						Nickel	9.8	Potassium	25000	Potassium	9820	Potassium	4050	Mercury	1.2	Manganese	1070	Sodium	6030	Lead	3
						Potassium	3660	Sodium	688000	Sodium	258000	Sodium	60500	Potassium	68400	Mercury	1.2	Cyanide	85900	Magnesium	26700
						Sodium	58200	Vanadium	3.54	Zinc	560	Zinc	81.8	Sodium	1980000	Nickel	81.9	Silver	10.4	Nickel	33.2
						Vanadium	3.7	Zinc	43.9					Vanadium	6.4	Potassium	8520	Thallium	42.2	Potassium	12700
																Sodium	182000			Sodium	141000
																Zinc	316			Vanadium	2.6
																				Zinc	52.9

*analyte was found in the associated blank as well as in the sample

Concentration exceeds Class FW2 surface water quality standard. FW2 (general surface waters not designated in N.J.A.C. 7:9b-1.15(h) to be set aside for posterity) standards are referred to here only for comparison.
FW2 is effectively the most stringent standard outside of waters set aside for posterity, the less stringent SE (the general surface water classification applied to saline waters of estuaries) is likely applicable to Peach Island Creek.

TABLE A-8
216 PATERSON PLANK ROAD SITE
SUMMARY OF SURFACE WATER QUALITY DATA
METALS
CARLSTADT, NEW JERSEY

SAMPLE ID	LOCATION	SAMLING DATE																	
		Apr-95 9th O&M		Apr-96 13th O&M		Nov-97 19th O&M		Oct-98 23rd O&M		Dec-99 27th O&M		Dec-00 28th O&M		Nov-01 29th O&M		Sep-02 30th O&M		Nov-03 31st O&M	
SW-01	Off-Property	Aluminum	471	Beryllium	0.39	Cobalt	0.78	Cobalt	1.1	Cadmium	0.53	Cadmium	0.62	Mercury	0.15	Silver	1.2	Cadmium	0.27
		Antimony	3.2	Vanadium	3.3	Vanadium	2.8	Cadmium	1.8	Cobalt	0.75	Cobalt	0.96	Vanadium	1.6	Cobalt	2	Arsenic	1.6
		Arsenic	5.2	Nickel	6.7	Chromium	7.6	Vanadium	2.6	Vanadium	2.7	Vanadium	2.5	Chromium	4	Thallium	3.1	Vanadium	2.7
		Barium	75.5	Chromium	9.1	Copper	7.7	Arsenic	4.4	Nickel	10.9	Arsenic	4.2	Copper	5.2	Arsenic	4.9	Nickel	3.9
		Cadmium	0.74	Copper	11.9	Nickel	9.5	Copper	7	Copper	14.8	Copper	4.6	Nickel	6.5	Vanadium	5.4	Copper	6.4
		Calcium	94700	Cyanide	20	Barium	51.4	Nickel	10.4	Barium	49.3	Chromium	6.4	Barium	73.1	Nickel	6.5	Chromium	8.4
		Chromium	31.2	Barium	33.6			Barium	92.2	Potassium	15000	Nickel	8.6	Aluminum	173	Copper	7.9	Barium	67.8
		Cobalt	1.4	Zinc	64			Iron	842			Barium	58.3	Iron	342	Chromium	9.9	Potassium	29400
		Copper	16.4					Potassium	156000			Aluminum	167			Barium	84.5	Sodium	430000
		Iron	2030									Potassium	114000			Potassium	152000		
		Lead	13.4																
		Magnesium	169000																
		Manganese	715																
		Mercury	2.9																
		Nickel	13.1																
		Potassium	98500																
		Sodium	1260000																
		Thallium	4.5																
		Vanadium	5.4																
		Zinc	136																
SW-02	Off-Property	Aluminum	340	Beryllium	0.37	Beryllium	0.14	Beryllium	0.26	Vanadium	1.8	Cadmium	0.44	Cadmium	0.5	Cadmium	0.21	Silver	0.72
		Antimony	11.9	Vanadium	3.1	Cobalt	1.6	Cobalt	0.85	Cadmium	1.9	Cobalt	0.79	Vanadium	1.5	Silver	1.1	Arsenic	2.3
		Barium	76.5	Nickel	18.9	Vanadium	3.7	Vanadium	0.92	Cobalt	2.2	Vanadium	2.2	Arsenic	3.3	Antimony	1.9	Vanadium	2.6
		Cadmium	0.65	Cyanide	20	Chromium	8.2	Cadmium	1.5	Barium	60	Copper	5.6	Chromium	4.5	Vanadium	2.9	Nickel	4.2
		Calcium	84800	Copper	22.6	Copper	9	Lead	2.7	Potassium	12700	Chromium	7.4	Copper	5.4	Arsenic	3.5	Copper	4.7
		Chromium	17.1	Barium	51.3	Nickel	10.2	Arsenic	3.6			Nickel	8.3	Nickel	7	Copper	4.9	Chromium	6.4
		Cobalt	1.4	Zinc	122	Barium	56.4	Copper	5.6			Barium	58.4	Barium	81.7	Thallium	5.7	Barium	70.1
		Copper	23.6					Chromium	6.7			Aluminum	165	Aluminum	194	Nickel	6.8	Potassium	29300
		Iron	2270					Zinc	11.1			Potassium	82400	Iron	406	Chromium	7.3	Sodium	430000
		Lead	9.8					Nickel	12.8							Zinc	18.6		
		Magnesium	107000					Barium	75.7							Barium	84.7		
		Manganese	765					Aluminum	168							Potassium	165000		
		Mercury	1.4					Iron	777										
		Nickel	15.6					Potassium	116000										
		Potassium	58700																
		Selenium	4.5																
		Silver	0.5																
		Sodium	762000																
		Vanadium	5.8																
		Zinc	82.6																

TABLE A-8
216 PATERSON PLANK ROAD SITE
SUMMARY OF SURFACE WATER QUALITY DATA
METALS
CARLSTADT, NEW JERSEY

SAMPLE ID	LOCATION	SAMLING DATE																					
		Apr-95 9th O&M		Apr-96 13th O&M		Nov-97 19th O&M		Oct-98 23rd O&M		Dec-99 27th O&M		Dec-00 28th O&M		Nov-01 29th O&M		Sep-02 30th O&M		Nov-03 31st O&M	
SW-03	Off-Property	Aluminum	121	Beryllium	0.61	Beryllium	0.11	Cobalt	0.79	Cadmium	1.3	Cadmium	0.66	Vanadium	1.3	Cadmium	0.21	Mercury	0.11
		Antimony	10	Cadmium	1.1	Cadmium	0.8	Vanadium	0.83	Cobalt	1.9	Cobalt	1.2	Chromium	7.1	Cobalt	0.83	Chromium	0.89
		Barium	72.8	Cobalt	1.8	Cobalt	0.93	Cadmium	1.5	Vanadium	2.3	Vanadium	2.2	Copper	7.2	Silver	1.3	Vanadium	0.98
		Cadmium	0.35	Vanadium	2.9	Antimony	3.4	Lead	2.3	Copper	20.9	Copper	7	Nickel	10.6	Arsenic	3.7	Lead	1.6
		Calcium	79900	Antimony	3.8	Vanadium	3.7	Arsenic	4.3	Barium	55.5	Chromium	8.8	Barium	92.1	Vanadium	4.4	Nickel	2
		Chromium	11.6	Copper	40.8	Thallium	5.1	Chromium	5.7	Potassium	14800	Nickel	13	Aluminum	150	Thallium	4.9	Copper	6.2
		Cobalt	1.4	Barium	60	Nickel	14.9	Copper	6.2			Barium	64.9	Iron	827	Copper	7.2	Barium	93.3
		Copper	20.2	Potassium	6810	Copper	23.2	Zinc	6.8			Potassium	66500			Nickel	7.6	Aluminum	111
		Iron	1840			Barium	62.1	Nickel	13.1							Chromium	9	Potassium	5340
		Lead	9.4					Barium	74.5							Barium	93.4	Sodium	89800
		Magnesium	89000					Aluminum	119							Potassium	145000	Sodium	89800
		Manganese	717					Iron	755										
		Mercury	1.1					Potassium	107000										
		Nickel	14.9																
		Potassium	47900																
		Sodium	641000																
		Vanadium	5.4																
		Zinc	58.4																
SW-04	Off-Property	Aluminum	298	Beryllium	0.31	Beryllium	0.17	Beryllium	0.27	Cadmium	2.1	Cobalt	0.88	Cobalt	1	Cadmium	0.35	Arsenic	2.5
		Antimony	11	Cadmium	1.5	Cobalt	2.2	Cobalt	1.1	Vanadium	2.3	Cadmium	0.92	Vanadium	1.2	Lead	1.7	Vanadium	2.6
		Barium	79.7	Cobalt	1.5	Vanadium	3.6	Vanadium	1.3	Cobalt	2.4	Vanadium	2.3	Chromium	5.2	Cobalt	2.4	Nickel	6.4
		Cadmium	0.44	Lead	2.4	Cadmium	3.7	Cadmium	1.5	Barium	58.6	Lead	2.6	Copper	8.3	Antimony	3.3	Copper	6.5
		Calcium	76500	Vanadium	2.7	Barium	76.5	Lead	2.2	Potassium	13200	Arsenic	4.9	Nickel	10.7	Arsenic	4.6	Chromium	9
		Chromium	23.8	Arsenic	5			Antimony	2.5			Copper	8.1	Aluminum	63.4	Vanadium	6.1	Zinc	14.1
		Cobalt	1	Cyanide	20			Arsenic	3.2			Chromium	8.3	Barium	95.1	Copper	6.2	Barium	70.5
		Copper	21.9	Barium	50.6			Thallium	3.7			Nickel	16.5	Potassium	148000	Thallium	7.3	Aluminum	175
		Iron	2380	Zinc	247			Copper	4.5			Barium	69			Chromium	8.1	Potassium	12200
		Lead	7.4					Zinc	5.6			Aluminum	192			Zinc	9.7	Sodium	209000
		Magnesium	74500					Chromium	6.3			Potassium	58400			Nickel	12.6		
		Manganese	804					Nickel	13.9							Barium	90.8		
		Mercury	1.4					Barium	79.6							Aluminum	198		
		Nickel	24.5					Aluminum	131							Potassium	122000		
		Potassium	39900					Iron	790										
		Sodium	523000					Potassium	101000										
		Vanadium	6																
		Zinc	54.1																

*analyte was found in the associated blank as well as in the sample

Concentration exceeds Class FW2 surface water quality standard. FW2 (general surface waters not designated in N.J.A.C. 7:9b-1.15(h) to be set aside for posterity) standards are referred to here c
FW2 is effectively the most stringent standard outside of waters set aside for posterity, the less stringent SE (the general surface water classification applied to saline waters of estuaries) is likely apr